ABX Micros CRP 200

Technical manual

P/n: RAA028A

CE IVD

HORIBA ABX
B.P. 7290
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HORIBA ABX
Diagnostics

Revisions

Part number	Technical Note	Software revision	Sections	Date
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This document applies to the latest software version as indicated above.

When a subsequent software version changes the information in this document, a new section and/or sections will be released.

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- Potential hazards:

To alert the operator of potentially hazardous conditions, one of the bold captioned headings which are described below is provided wherever necessary throughout this text.

Flags a procedure that if not followed properly, can prove to be extremely hazardous to either the operator or the environment or both.

Emphasizes an operating procedure that must be followed to avoid possible damage to the instrument or erroneous test results.

Emphasizes important information especially helpful to the operator before, during or after a specific operational function.

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1. Working conditions

1.1. Environment

- The operation of the ABX Micros CRP 200 should be restricted to indoor location use only! Operation of the instrument at altitudes of over 2000 meters (6000 feet) is not recommended.
- The instrument is designed for safety from voltage surges according to INSTALLATION CATEGORY II and POLLUTION DEGREE 2 (IEC EN 61010-1).
- Please contact your local HORIBA ABX representative for any information regarding the operation location when it does not comply with the recommended specifications.

1.2. Location

- The ABX Micros CRP 200 should be placed on a clean and leveled table or workbench.
- Please note that the ABX Micros CRP 200 and printer weigh approximately 30 kilograms (66 lbs).
- Avoid direct exposure to sunlight.
- Place your instrument where it is not exposed to water or vapor.
- Place your instrument where it is free from vibration or shock.
- Place your instrument where an independent power receptacle can be used. Use a receptacle different from the one used by a device that easily generates noise such as a centrifuge, etc...
- Proper ventilation is required on the ABX Micros CRP 200. Provide a space of at least 20 cm (8 inches) at the back of the instrument to prevent overheating of the power supply.

The ON/OFF switch and the input voltage connection must always be accessible! When positioning the system for operational use, leave the required amount of space for easy accessibility to these items.

1.3. Grounding

- Proper grounding is required when installing the system. Check the wall outlet ground (Earth) for proper grounding to the facilities electrical ground. If you are unsure of the outlet grounding, contact your facilities engineer to verify the proper outlet ground!

1.4. Electromagnetic Environment Check

- The ABX Micros CRP 200 has been designed to produce less than the accepted level of electromagnetic interference in order to operate in conformity with its destination, allowing the correct operation of other instruments also in conformity with their destination.
- In case of suspected electromagnetic noise, check that the instrument has not been placed in the proximity of electromagnetic fields or short wave emissions, i. e. (Radar, X-rays, Scanners, Cell phones.....etc.)

1.5. Humidity and temperature conditions

- Temperature range:
  CBC mode and CRP mode (CBC+CRP):
  ABX Micros CRP 200 must function between 18 to 30°C (65 to 86°F).

Results will be displayed under 18°C (64.4°F) but are not reliable.

- Humidity:
  Maximum relative humidity should be 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F). If the system is kept at a temperature less than 10°C (50°F) or less, it must be allowed to sit at room temperature for 1 hour before it can be used for operation.

1.6. Environmental Protection

- Disposal Used accessories and consumables:
  Must be collected by a laboratory specialized in elimination and recycling of this kind of material according to the local legislation.

- Disposal ABX Micros CRP 200 instrument:
  It should be disposed of, in accordance with local legislation, and should be treated as being contaminated with blood. The appropriate biological precautions should be taken. If any doubt, please contact your HORIBA ABX representative service department.

1.7. Transportation and Storage Conditions

- Storage temperature: -20°C (-68°F) +50°C (+122°F)

- Storage humidity: 85% or less

Prior to the shipping of an instrument by transporter, whatever the destination, an external decontamination of the instrument must be carried out.

Specifications

CONTENTS:

1. Technical Specifications

- Model: ABX Micros CRP 200
- Measurement mode:
  CBC mode (blood count item only)
  CBC + CRP mode (blood count item + CRP item)
  QC (CBC) mode (for CBC accuracy control)
  QC (CRP) mode (CRP)
- Measurement item:
  WBC, RBC, HGB, HCT, PLT, CRP (C-reactive protein)
  MCV, MCH, MCHC, RDW, MPV, LYM%, LYM#, MON%, MON#, GRA%, GRA#
  PCT*, PDW*.

*: In the USA, PCT and PDW parameters are for research use only and not for use in diagnostic procedures.

- Methods and technologies:
  WBC, RBC and PLT: Impedance
  HGB: Spectrophotometry (Cyanmethemoglobin method)
  CRP: Latex immuno turbidity rate method

Calculations from stored data that was directly measured for HCT, MCV, MCH, MCHC, RDW, MPV, PCT* and PDW*.

*: In the USA, PCT and PDW parameters are for research use only and not for use in diagnostic procedures.

- Sample quantity:
  CBC mode: 10µL
  CBC + CRP mode: 18µL
  QC (CBC) mode: 10 µL
  QC (CRP) mode: 18 µL
- Throughput analyses:
  CBC mode: Within 75 seconds (48 samples/hour)
  CBC + CRP mode: Within 270 seconds (14 samples/hour)
  QC (CBC) mode: Within 75 seconds (48 samples/hour)
  QC (CRP) mode: Within 270 seconds (14 samples/hour)
- Reagents:
  ABX Minidil LMG (10 Liters).
  ABX Cleaner (0.5 L)
  ABX Lyse (0.4L)
  ABX CRP REA (CRP-R1, CRP-R2, CRP-R3: total 50 mL)

2. Physical Specifications

- Power Requirements:
  Power supply from 100 V AC to 240 V AC +/- 10%
  50 Hz to 60 Hz.
- Power consumption
  Maximum 150 VA.
- Printer
  Depends on printer model (See printer's manual).
- Operating Temperature and Humidity:
  18°C - 30°C (64°F-86°F) room temperature.

Maximum relative humidity 80% for temperature up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F).

- Dimensions and Weight:
  Dimensions: 31 x 41 x 40 cm (11.8 x 16.7 x 15.7 in.)
  Weight: 18 Kg. (40 lbs.)

- Minimum specimen volume:

  CBC Mode (CBC): 10µl.
  QC Mode (CBC): 10µl.
  CBC/CRP Mode (CRP): 18µl.
  QC mode (CRP): 18µl.

- Dilution ratios:

  WBC: 1/260.
  RBC/PLT: 1/15000.
  CRP: 1/50.

- HGB measurement:

  HGB chamber : LED 555 nm.
  Modified Drabkin method (cyanmethemoglobin).
  Light source: Electroluminescent diode.
  Wavelength: 550nm +/- 10nm.

- CRP Measurement:

  CRP Chamber: LED 850 nm.
  Latex Immunoturibidity rate method
  Light source: Electroluminescent diode.
  Wavelength: 850nm +/- 10nm.

- Counting Aperture Diameters:

  WBC: 80µm.
  RBC/PLT: 50µm.

- Reagent Consumption (ml)

Cycles	Estimated duration (min.) (s)	MiniDil LMG (ml)	Lyse(ml)	Cleaner (ml)	R1 (ml)	R2 (ml)	R3 (ml)
STARTUP (1 blank cycle)	1'20"	27.7	1.4	1.5	-	-	-
SHUTDOWN	1'00"	-	-	17	-	-	-
Analysis CBC	1'15"	15.9	0.5	1.3	-	-	-
Analysis CBC/CRP	4'30"	30.3	0.5	0.9	0.1	0.1	0.2
Prime ALL Reagents	2'25"	40.0	12.0	6.0	-	-	-
Prime DILUENT	1'24"	27.0	-	-	-	-	-
Prime LYSE	1'31"	-	11.6	-	-	-	-
Prime CLEANER	1'13"	-	-	6.3	-	-	-
Complete Rinse	2'28"	-	-	-	-	-	-
CBC Bleach clean	2'56"	-	-	-	-	-	-
CRP Bleach clean	1'14"	-	-	-	-	-	-
AUTOCLEAN	1'33"	31.3	-	18.9	-	-	-
Hgb Photometer Adjust	0'55"	6.0	1.3	-	-	-	-
CRP Blank Adjust	0'55"	6.0	-	-	-	-	-
BACKFLUSH	0'24"	15.6	-	-	-	-	
Wake up from sleep mode	0'40"	14.3	0.5	1.3	-	-	-

STARTUP cycle estimated duration and consumptions are given for one blank cycle control. It could be a maximum of three cycles if Startup does not pass the first time.

3. ABX Micros CRP 200 description

3.1. Front view

◆Start/Pause key

This key is used to change the sleep state to the measurement ready state.
It is also used to set the instrument in the sleep state. Press this key to cancel an error.

◆Mode Key

This key is used to toggle the measurement mode among:
Blood count measurement item mode CBC, CBC + CRP measurement mode, QC (CBC) and QC(CRP) check (quality assurance).
This key is also used to open the sample holder in the sleep state.

◆Shut Down key

Press this key when ending measurement for the day (pressing this key performs automatic cleaning and fills the instrument with the cleaning liquid. The power switch can be turned OFF in this state).

◆Measurement key & sample holder

This key is used to start measurement.
This holder holds the sample tube and the control blood (measurement starts by closing the holder).

B

◆Reagent door 1 open/close
Allows the access to reagents by pushing the place where PUSH is written.

C

◆Display unit
Displays the measurement results and operating state of the instrument.

3.2. Display unit

◆Cycle LED:
Lights up or blinks during measurement.

◆Ready LED:
Lights up when measurement is possible or operation commands can be input with the operation keys.

◆Busy LED:
Lighting of the LED indicates that the instrument is not prepared for measurement. When this LED is lit, input with the operation key cannot be done. When ending operation for the day (shutdown), this LED lights up or blinks. This LED lights up during the sleep state.

◆Error LED:
Lights up or blinks if any error occured in the instrument.

A

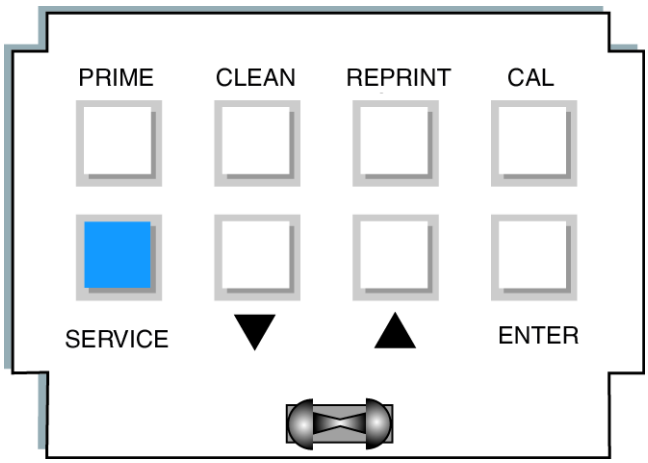
◆Sample number display:
Displays sample numbers. If an error occurs, the error code number is displayed. During the measurement of the blood count item + CRP item, counts down and displays the measurement time left.

B

◆Measurement result display:
Displays the result of each measurement item. When setting the time and, during calibration, displays numerical value of each operation.

3.3. Operation panel

The User function keypad on the ABX Micros CRP 200 has «8» basic keys with their functions indicated either above or below the key. Those keys allow the operator to initiate cycles, access menu functions, reprint or transmit results, modify specific menus and enter calibration coefficients.
The primary function of each key is descibed in detail.



- Prime key:
  Reagent ABX Minidil LMG, ABX Lyse and ABX Cleaner will be primed into the instrument (required time: 3 min and 30 seconds/ injection).

- Clean key:
  This key is used to clean the measuring cell and tubing of the instrument.

- Reprint key:
  This key is used to send the result of the last measurement to the printer or RS-232C.
  It is also used to print calibration coefficients or limit values.

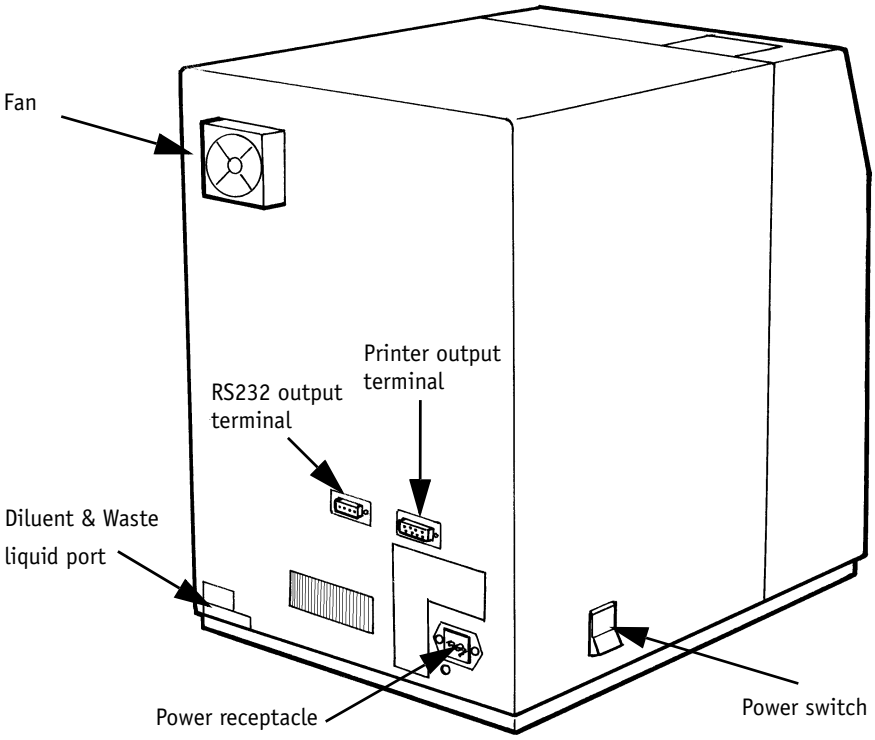
- Calibration key:
  This key is used to enter the calibration coefficient and CRP reagent sensitivity factor.

- «Up» and «Down» arrow key:
  Those keys are used to change the numerical values.

- Enter key:
  This key is used to enter the changed numerical values.

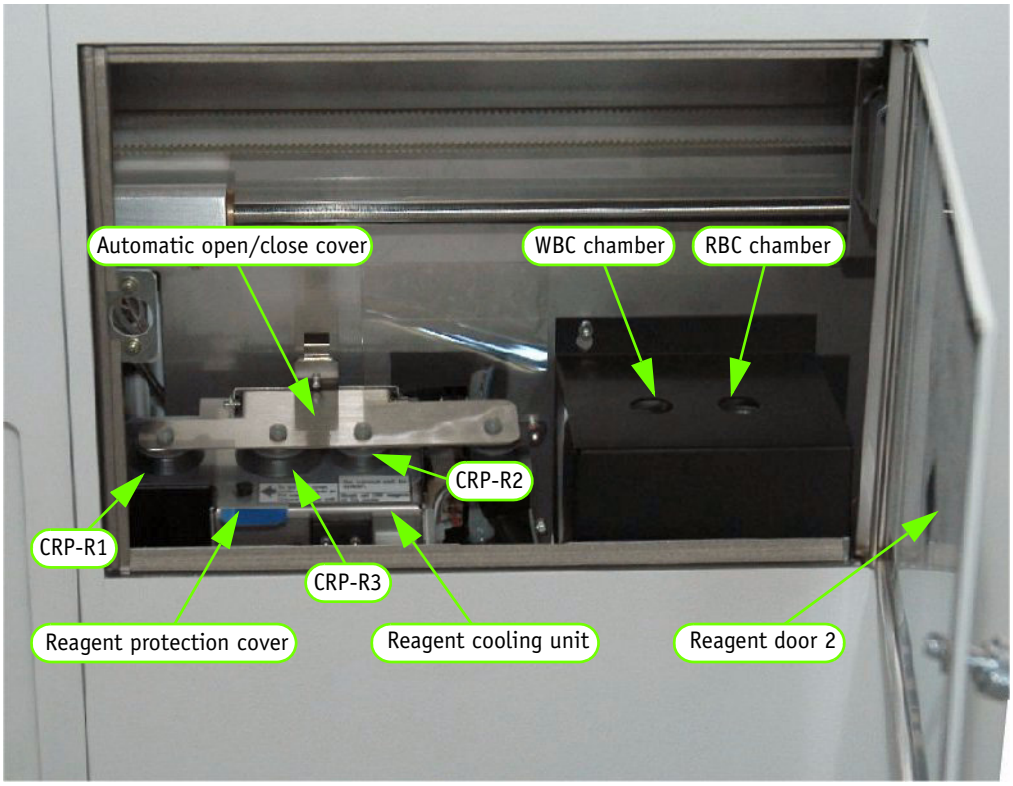
- Service key:
  This key is used for maintenance of the instrument and various settings.
  Do not touch this key unless instructed to do so in this manual or by your service representative.

3.4. Left side and rear



- Power switch:
  Placing this switch to ON supplies the power to the instrument
- Power receptacle:
  Power cable is connected to this receptacle
- Diluent port:
  ABX Minidil tube is connected here
- Waste liquid port:
  Waste liquid tube is connected here
- RS232 output terminal:
  A cable used for an external computer is connected here
- Printer output terminal:
  Printer is connected here

3.5. Right side view



- Reagent setting position:
  Set the reagents (ABX CRP REA: CRP-R1, CRP-R2 and CRP-R3) in the instrument as illustrated.

- Reagent door 2:
  Turn the button to open the door.

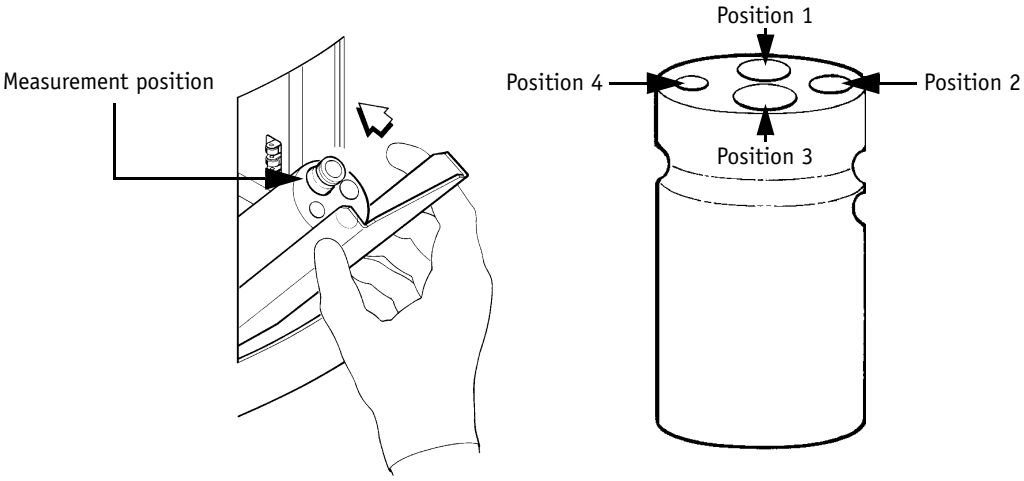
- Reagent protection cover:
  This cover prevents evaporation of reagent, and dust from getting into reagents.

- Automatic open/close cover:
  Automatically opens/closes during measurement and primes the reagents separately.

- Reagent cooling unit.
  Keeps the reagent ABX CRP REA (CRP-R1, CRP-R2 and CRP-R3) cold.

Do not open the reagent door 2 during measurement and during cleaning. If the reagent door 2 is opened, measurement and cleaning stop. By closing the door, the operation continues. But, if the door is opened or closed during measurement, the reliability of the measured values will be lost, so please be careful.

3.6. Sample tube holder



- Position 1:
  (ø13mm x 81mm) for normal sample tube, for example Venoject II, Nipro neo tube, etc.
- Position 2:
  (ø8mm x 45mm) for a small sample tube.
- Position 3:
  (ø18.8mm x 35mm) for the control blood bottle and calibration serum CRP.
- Position 4:
  (ø10.5mm x 68mm) for sampling cup (0.5 ml).

3.7. Things to remember during operation

3.7.1. Sample:

- When a whole blood sample is used, use the anti-coagulant (EDTA-K3).
  Also, immediately after collecting the blood, turn and mix the blood 10 times or more.
- Before starting measurement, slowly turn and mix 5 to 10 times.
- Turbidity of the plasma, etc. will not affect the reaction. However, never allow foreign matters such as dirt, bacteria, and detergent to get into the mix.
- If the measurement range is exceeded, dilute the specimen.

3.7.2. Interfering substances:

Rheumatoid factor (Rf), bilirubin, lipids, abnormal proteins and hemoglobin in the sample do not affect the measurement of CRP only.

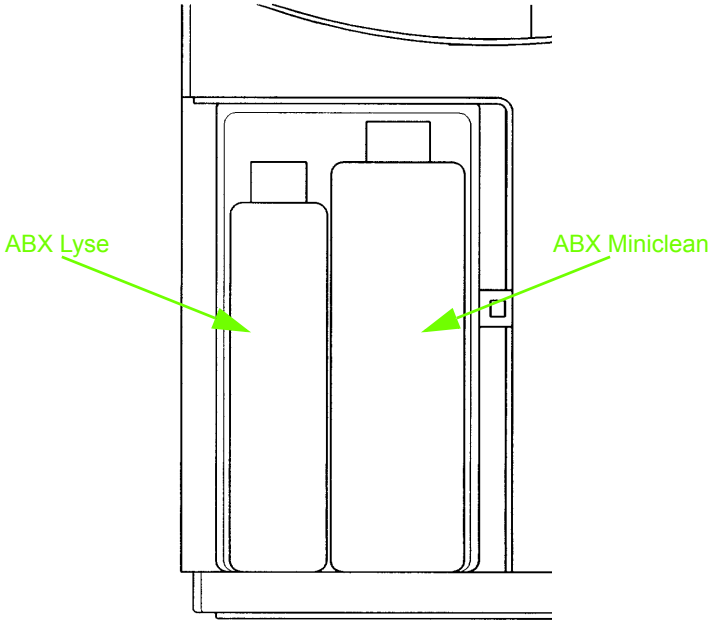
3.8. Precaution during operation or handling

- When operating the instrument, follow this manual.
- Observe Universal Precautions when operating this instrument or handling the specimen.
- After the reagent is opened, use it as soon as possible. Close the lid of the container, and store the reagent in accordance with the specified method. Do not use any reagent after its expiration date has passed.
- Do not use frozen reagent. Latex particles will cause auto agglutination to generate «sensitivity deterioration» and «*mark error».
- Mix ABX CRP REA-R3 before use.
- Do not mix reagents of different lots. Further, in calibration and sample measurement, be sure to use reagent of the same lot.
- Avoid mixing leftover reagent. Use the same lot of ABX CRP REA-R1, ABX CRP REA-R2, and ABX CRP REA-R3.
- Take care so that dirt does not get into the reagent and cell.
- ABX CRP REA-R1, ABX CRP REA-R2, and ABX CRP REA-R3 contain sodium azide of 0.1% or less. Sodium azide may generate explosive metal azide when reacted with zinc or copper pipes.
  When disposing of this solution, use a large quantity of water.

For treatment of waste liquid, refer to Chapter 5, «*Daily maintenance, Treatment of waste liquid*.

- All suspect results should be rechecked by reanalysis and/or alternative method.
- Results from the instrument should be used in combination with the clinical symptoms of the patient and the test results.

3.9. Reagent door inside



Reagent setting position
Reagent ABX lyse and ABX Miniclean are set as illustrated.

Hydraulic & Pneumatic principles

CONTENTS:

1. Hydraulic

1.1. Hydropneumatic connections

Circuit	From	To
Diluent circuit		
	Diluent reagent connection	Liquid sensor-1
	Liquid sensor-1	T1-3
	T1-1	EV11-1
	EV11-3	Temperature sensor
	Temperature sensor	Diluent syringe-3
	EV11-2	EV10-3
	EV10-2	T2-1
	T2-3	Sample syringe-5
	Sample syringe-2	Sample needle
	T2-2	EV15-2
	EV15-3	CRP syringe-1
	EV15-1	EV14-3
	EV14-1	T1-2
	EV14-2	T4-2
	T4-1	CRP flowcell (top)
	CRP flowcell (bottom)	CRP mixing chamber
	EV10-1	EV7-3
	EV7-1	Rinsing block-2
	Rinsing block-1	EV8-3
	EV7-2	T6-1
	T5-2	WBC chamber-3
	WBC chamber-2	RBC chamber-3
	RBC chamber-2	EV6-2
Lyse circuit		
	Lyse bottle	Liquid sensor-2
	Liquid sensor-2	EV1-1
	EV1-3	Lyse syringe-4
	EV1-2	Liquid earth
	Liquid earth	T3-3
	T3-2	WBC chamber-1
Cleaner circuit		
	Cleaner bottle	Liquid sensor-2

Circuit	From	To
	Liquid sensor-2	EV4-2
	EV4-1	T5-3
Pressure/vacuum circuit		
	Air syringe-1	EV2-1
	EV2-2	Air
	Air syringe-2	Pressure sensor on CRP board
	Air syringe-3	EV8-1
	Air syringe-4	EV6-1
Pressure/vacuum circuit		
	Air syringe-5	T6-1
	T6-3	EV5-2
	EV5-1	Waste connection
	T6-2	T7-1
	T7-3	EV18-1
	EV18-2	T4-3
	T7-2	T8-3
	T8-2	EV12-1
	EV12-2	Isolator W
	Isolator W	T3-1²
	T8-1	EV13-1
	EV13-2	Isolator R
	Isolator R	RBC chamber-1

1.2. Functions of valves

Valve blocks are located close to concerned elements.
Two different blocks:
Valves 1, 2, 8, 10, 11, 14, 15: on front side, horizontal block, behind front panel (See “Fig.1: valve block 1, page 4”).

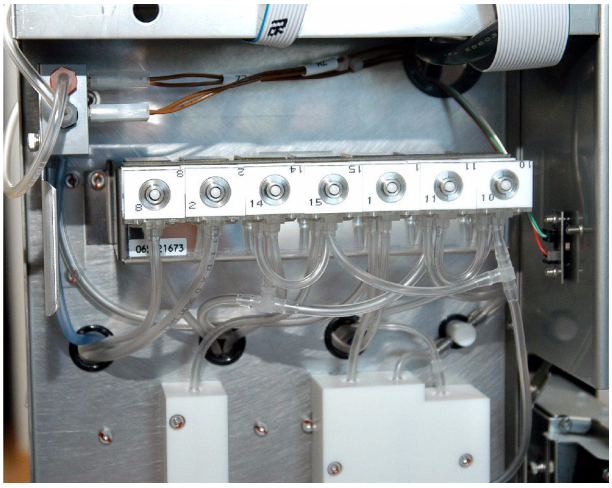


Fig.1: valve block 1

Valves 4, 5, 6, 7, 12, 13, 18: on right side, horizontal block, under WBC/RBC Chambers (See “Fig.1: valve block 1, page 4”).

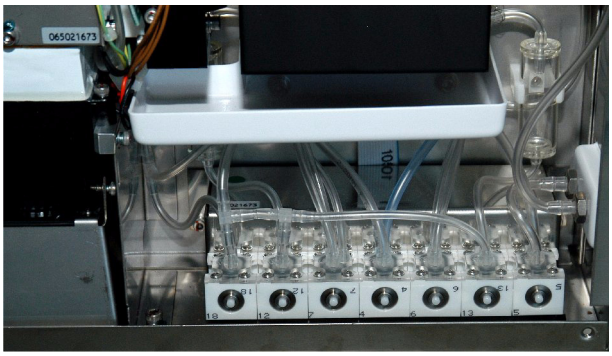
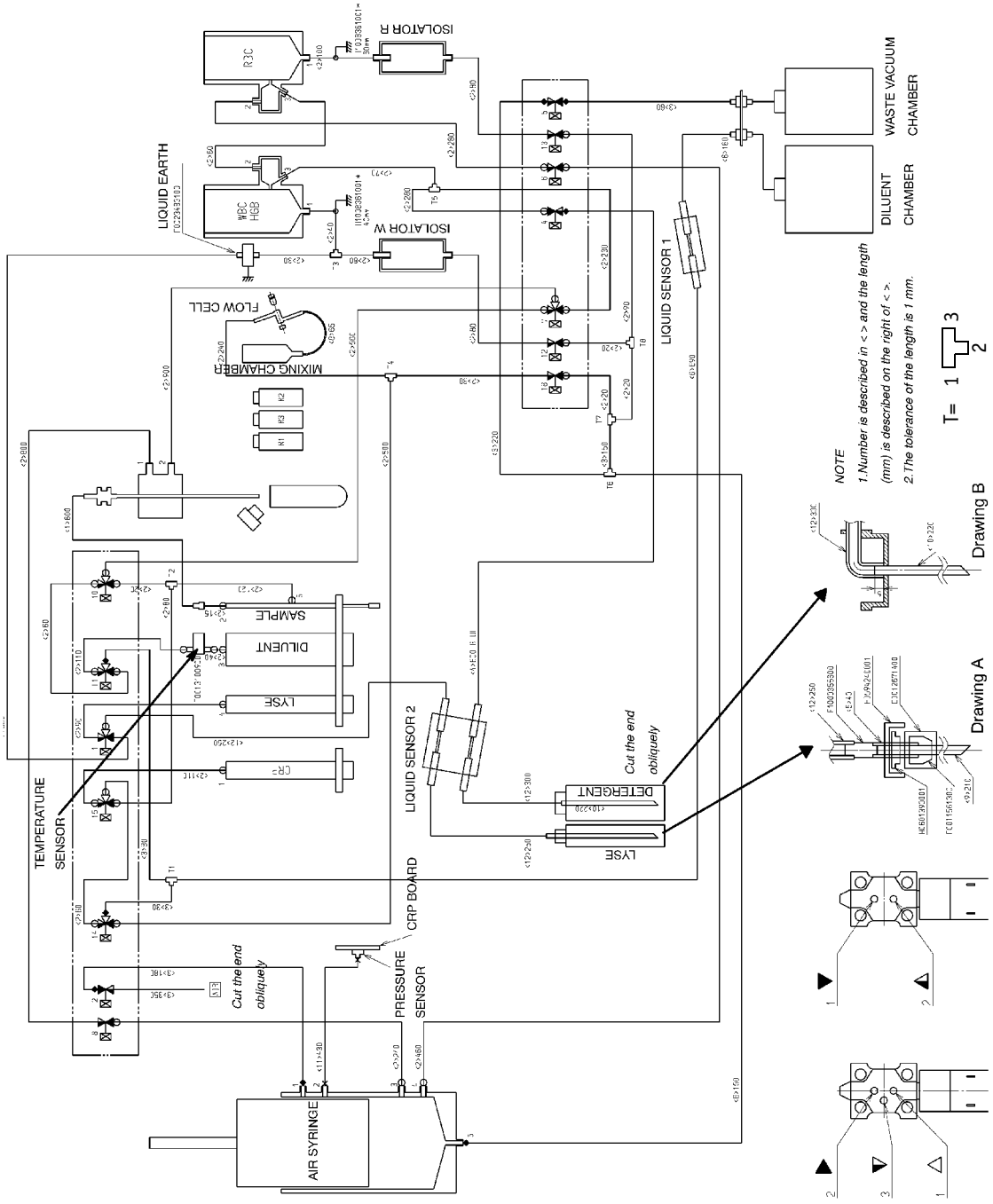


Fig.2: valves block 2

Valve N°	Valve Subject	Function
LV1	Lyse	Control Entry / Exit syringe
LV2	Vacuum syringe	Set to atmosphere
LV4	Cleaner	Counting heads cleaning
LV5	Waste	Control Entry / Exit
LV6	Drain	Counting heads
LV7	Diluent	Directing Rinsing block / Counting heads
LV8	Diluent	Draining of rinsing block

Valve N°	Valve Subject	Function
LV10	Diluent	Directing Sampling syringe / Valve 7
LV11	Diluent	Control Entry / Exit syringe
LV12	WBC chamber	Draining
LV13	RBC chamber	Draining
LV14	CRP chamber	Directing CRP chamber / Valve 15
LV15	CRP syringe	Control Entry / Exit syringe
LV18	CRP chamber	Draining

2. Pneumatic diagram

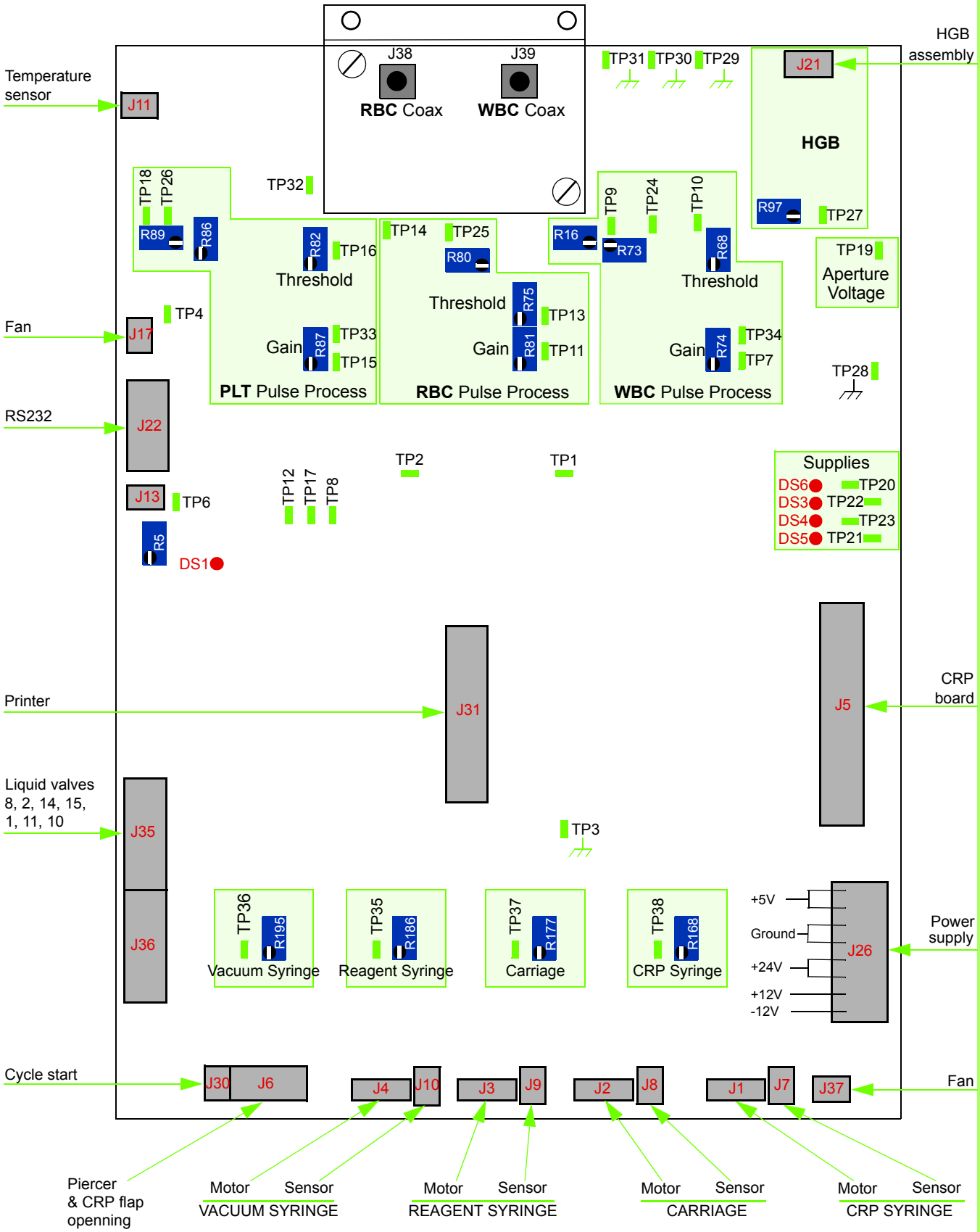


CONTENTS

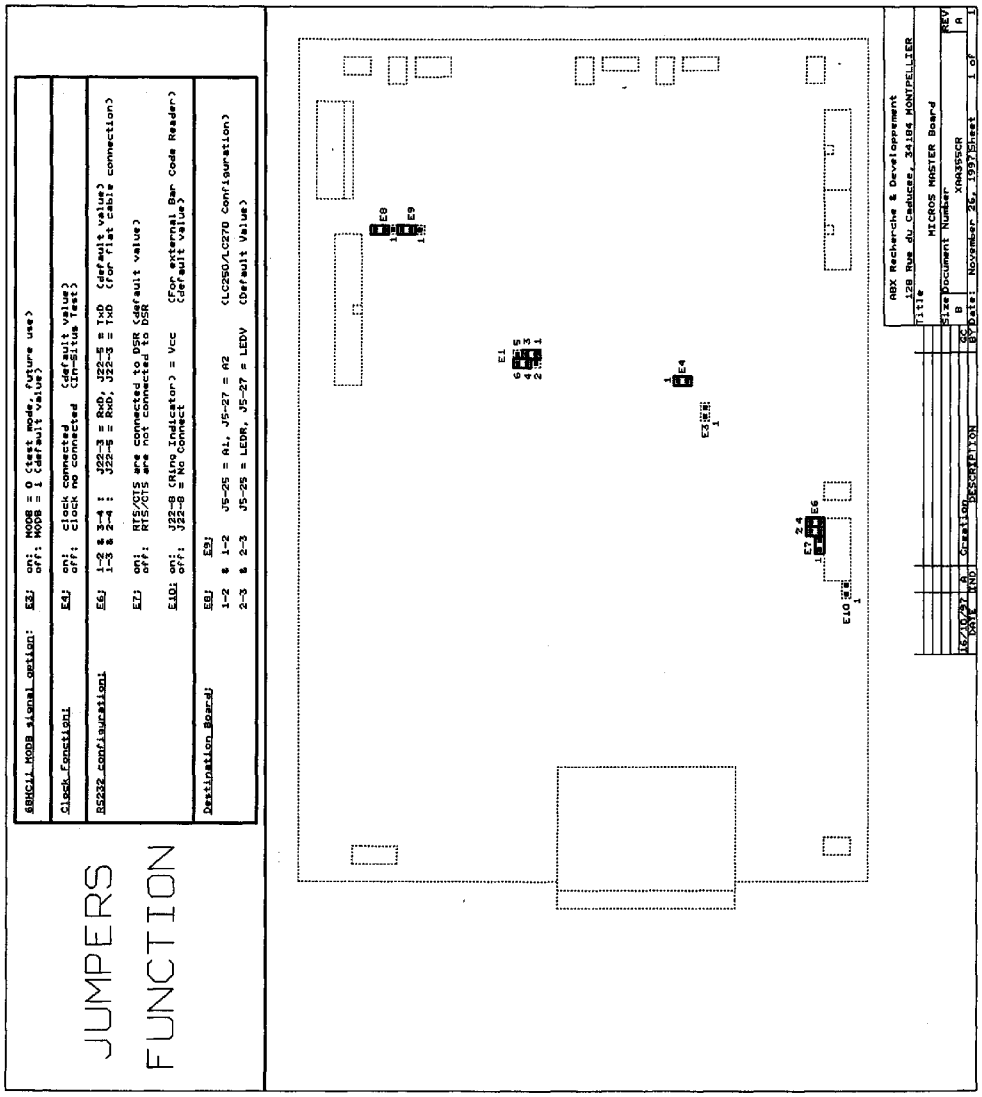
1. Main board general view

1.1. Test points

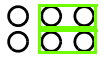
Adjustment	Test point	Ground	Potentiometer	Target value
WBC line adjustment	TP9		Factory adjusted	
WBC threshold	TP10	TP31	R68	280 mV +/-5
RBC line adjustment	TP14		Factory adjusted	
RBC threshold	TP13	TP31	R75	400 mV +/-5
PLT line adjustment	TP18		Factory adjusted	
PLT threshold	TP16	TP31	R82	180 mV +/-5
Power supply (check)	TP20	TP31	No adjustment	-12 V +/- 0.5
	TP21	TP31	No adjustment	+12 V +/- 0.4
	TP21	TP31	No adjustment	+5 V +/-0.15
	TP22	TP31	No adjustment	+24 V +2/-1
Reagent syringe motor voltage	TP35	TP31	R186	2.5V +/- 0.05
Vacuum syringe motor voltage	TP36	TP31	R195	2.5V +/- 0.05
Carriage motor voltage	TP37	TP31	R177	1.5V +/- 0.05
CRP syringe motor	TP38	TP31	R168	1.0V +/- 0.05
Aperture voltage (check)	TP19	TP31	No adjustment	60V -1.5/+2.8


Temperature sensor
J11
J38
J39
RBC Coax
WBC Coax
TP31
TP30
TP29
J21
HGB assembly
HGB
R97
TP27
TP32
TP18
TP26
R89
R86
R82
TP16
Threshold
Gain
R87
TP33
TP15
PLT Pulse Process
TP14
TP25
R80
Threshold
R75
TP13
Gain
R81
TP11
RBC Pulse Process
R16
TP9
TP24
R73
TP10
R68
Threshold
Gain
R74
TP34
TP7
WBC Pulse Process
TP19
Aperture Voltage
TP28
Fan
J17
TP4
RS232
J22
TP2
TP1
TP12
TP17
TP8
J13
TP6
R5
DS1
Supplies
DS6
DS3
DS4
DS5
TP20
TP22
TP23
TP21
Printer
J31
J5
CRP board
Liquid valves 8, 2, 14, 15, 1, 11, 10
J35
J36
TP3
TP36
R195
Vacuum Syringe
TP35
R186
Reagent Syringe
TP37
R177
Carriage
TP38
R168
CRP Syringe
+5V
Ground
+24V
+12V
-12V
J26
Power supply
Cycle start
J30
J6
J4
J10
J3
J9
J2
J8
J1
J7
J37
Fan
Piercer & CRP flap openning
Motor
Sensor
VACUUM SYRINGE
Motor
Sensor
REAGENT SYRINGE
Motor
Sensor
CARRIAGE
Motor
Sensor
CRP SYRINGE

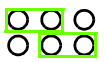
1.2. Main Board configuration



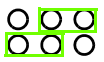
◆ E1 jumper configuration (language setting):



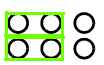
Japan



United States (no display with Hemalink)

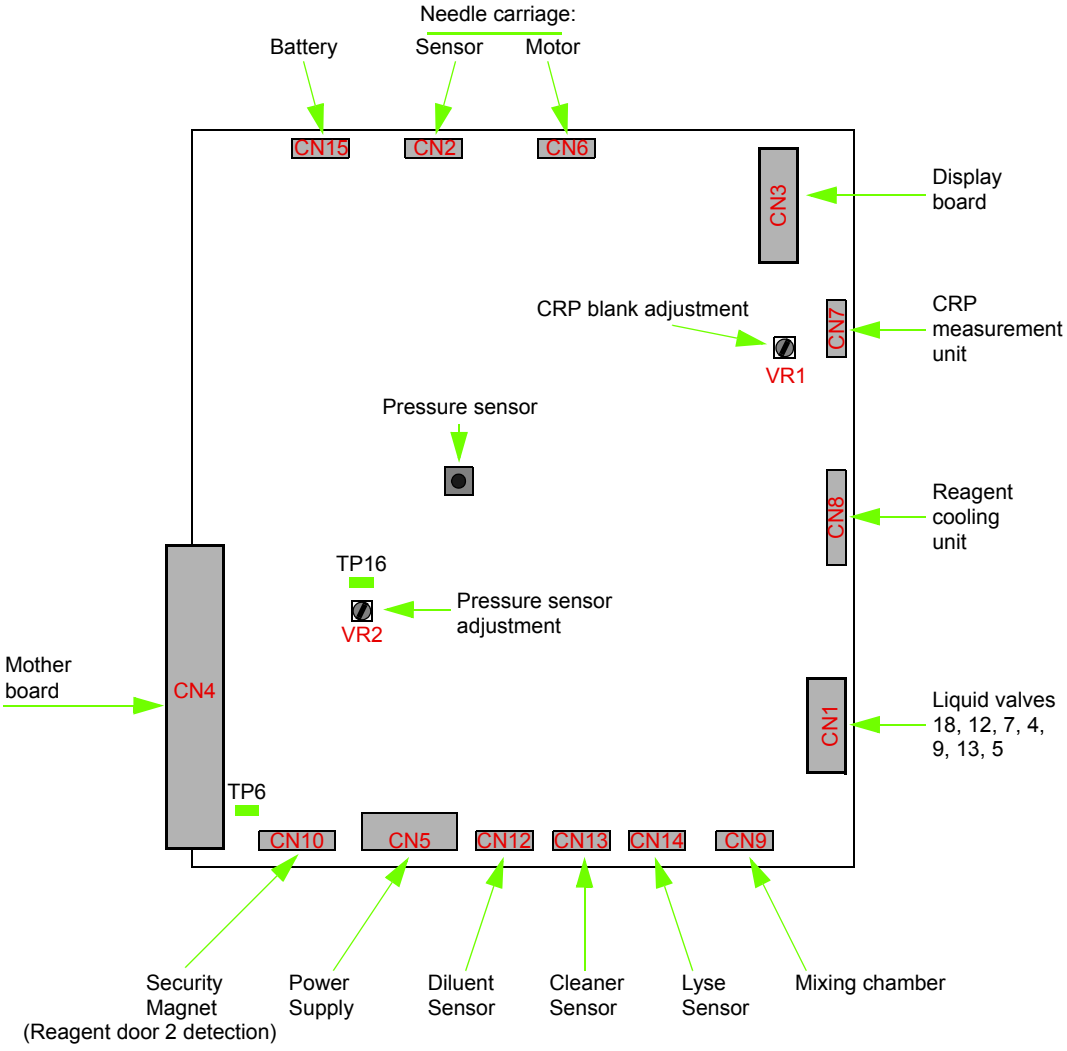


English



Japan

2. CRP board general view

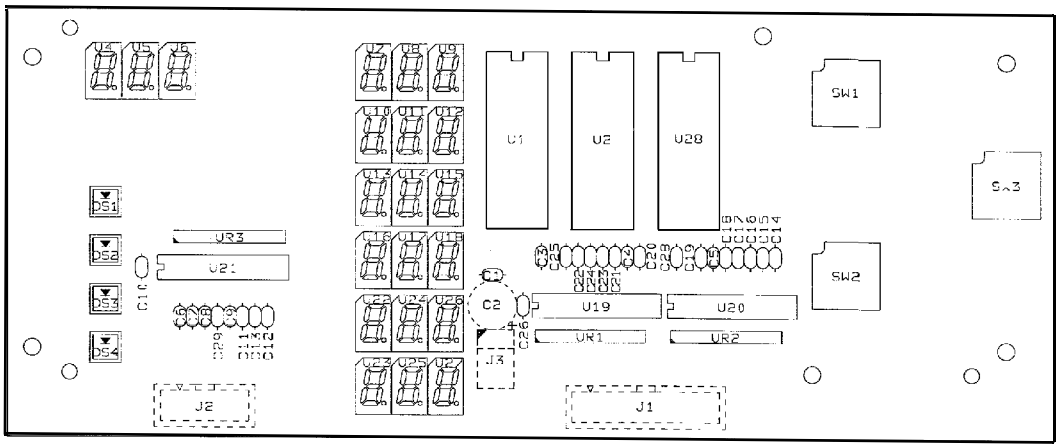


The CRP board drives all CRP functionnalities:
CRP chamber heating, CRP reagents cooling, CRP reagent door detection, CRP measurement.
CRP board is connected to main board via CN4 connector.
Display board is connected to CRP board via CN3 connector.
Power supply board is connected via CN5 connector

2.1. Test points

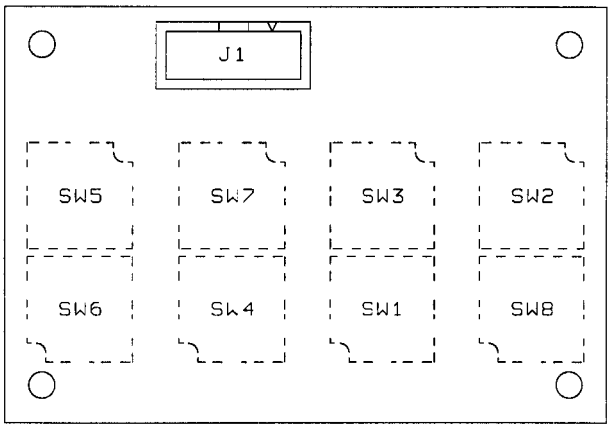
Adjustment	Test point	Ground	Potentiometer	Target value
Pressure sensor	TP16 (on CRP board)	TP6 (on CRP board)	VR2 (on CRP board)	1.7V +/- 0.1

3. Display board



Includes:
- Startup/Pause, Mode and Shut down keys and 7 LCD displays
Connected to CRP board via flat connector in J1, Keyboard board flat connector is connected in J2, Power supply is connected in J3

4. Switch board



Support keyboard and is connected to Display board.

5. Connections

5.1. Flat cables

Reference	From	to
E1000349200	J1 on Switch board	J2 on Display board
E1000349100	CN3 on CRP board	J1 on Display board
E1000348900	J1 on liq. valve block 8-10	J35 on Main board
H1009392001	J31 on Main board	Printer output
H1009391001	J22 on Main board	RS232 output
E1000349000	CN1 on CRP board	J1 on liq. valve block 5-18

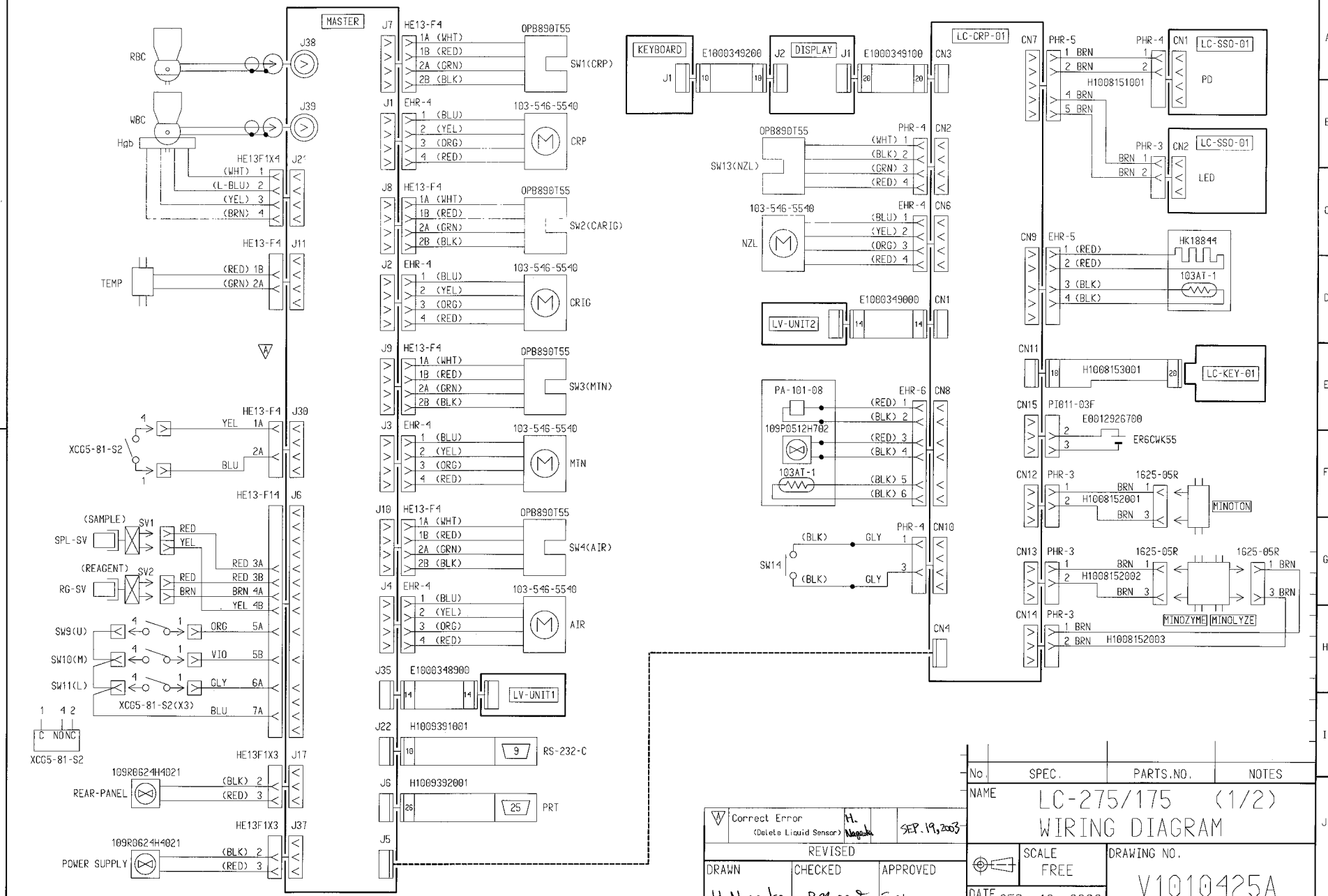
6. Synoptic

See Synoptic on next page

DRAWING NO. V1010425A

HORIBA

EXTERIOR DRAWING



No.	SPEC.	PARTS.NO.	NOTES

Correct Error (Delete Liquid Sensor) H. Nagaoka SEP. 19, 2003

REVISED

DRAWN	CHECKED	APPROVED
H.Nagaoka	S.Nagao	Y.Okamura

NAME LC-275/175 (1/2) WIRING DIAGRAM

SCALE FREE

DRAWING NO. V1010425A

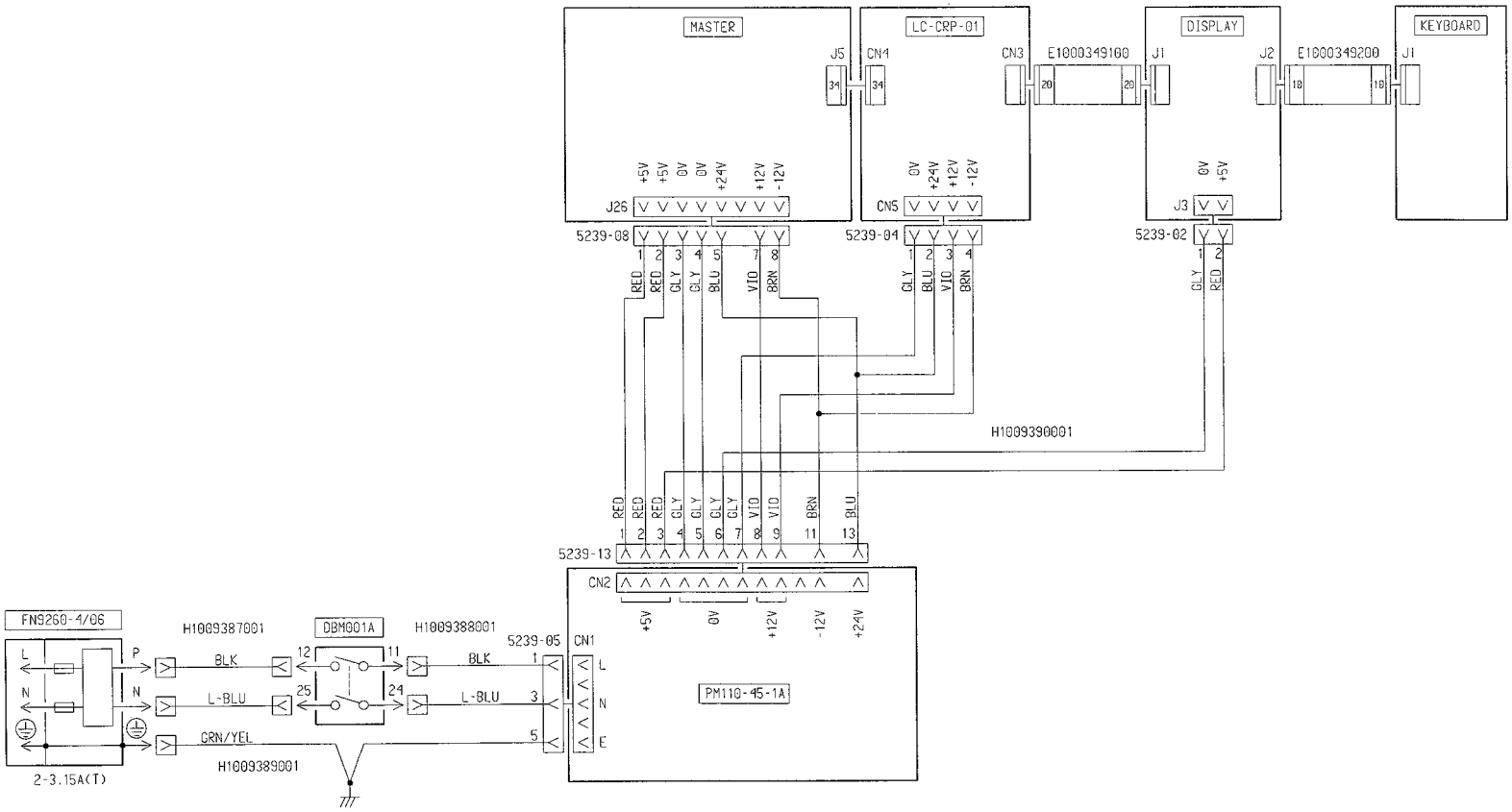
DATE SEP. 19, 2003

HOS HORIBA,Ltd.

DRAWING NO. V1010426

HORIBA

EXTERIOR DRAWING



No.	SPEC.	PARTS.NO.	NOTES

NAME LC-275/175 (2/2) WIRING DIAGRAM

REVISED				SCALE	DRAWING NO.
DRAWN	CHECKED	APPROVED		FREE	V1010426
TAKAHASI H.	T.Aoyama	N.Okll	DATE 2002.SEP.4		

HOS HORIBA,Ltd.

CONTENTS:

1. Measuring principles

1.1. WBC and differential count

1.1.1. General counting principles

The WBC measurement principles are the same as the RBC/PLT measuring principles. The WBC count is performed in the WBC/HGB chamber. The electronic signal-processing device places an electronic threshold between the WBC and PLT signals. The electronic pulses for the WBC are then placed into 256 channels according to their pulse size. The pulses are then thresholded, grouped and then mathematically calculated to create a numerical value for the determination of the WBC's.

1.1.2. Differential Measuring principles

The Diluent preserves and prepares the WBC cell membrane for differentiation reaction. The Lyse has specific reactions with each sub-population of the WBC cytoplasmic membranes.

- When the Lyse reacts with the Lymphocytes cytoplasmic membranes, it allows the release of water-soluble cytoplasm and shrinks the cell membrane around the nucleus.
- When the Lyse reacts with the Monocytes cytoplasmic membranes, it has an intermediate reaction, maintaining it's large size in comparison to the Lymphocytes.
- When the Lyse reacts with the Granulocytes cytoplasmic membranes, it has a limited reaction due to a molecule in their cytoplasmic structure which protects them from the shrinking action of the lyse. This limited reaction makes the Granulocytes the largest of the sub-populations in the cell differentiation.

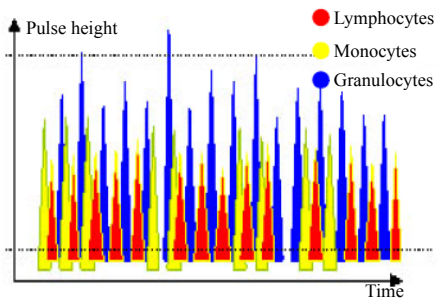
After the differential lysing action, the ABX Micros CRP 200 analyzes the height of each pulse as the cells pass through the micro-aperture in the WBC chamber. These pulses are then channelized, thresholded, grouped according to their size, (30fL to > 450fL), and calculated mathematically to create the WBC distribution curve, which is also known as the WBC Histogram.

The 3 sub-populations of WBC's are placed according to the number of cells and the size of cells in each sub-population. The distribution of WBC's are as followed:

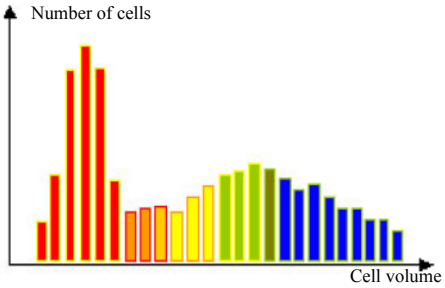
Lymphocytes	(30fL to 100fL)
Monocytes	(100fL to 150fL)
Granulocytes	(150fL to 450fL)

This differentiation term is also known as LMG's.

Cells passing through the WBC aperture creating electronic pulses.



Cells are grouped according to the number of cells and the cell size.



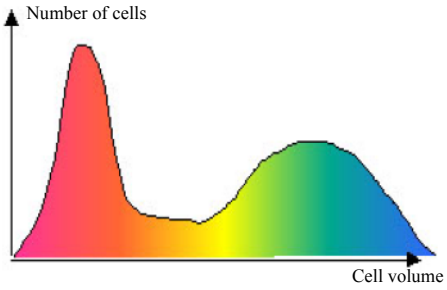
Pulses are electronically calculated and smoothed to produce the WBC distribution curve.

◆Results

Number of cells counted per volume unit x calibration coefficient

◆Histograms

Distribution curves on 256 counting channels from 30fl to 450fl.



◆ Technical characteristics for the WBC count:

Dilution	
Initial blood volume	10 µl
Vol. ABX DILUENT	2500 µl
First dilution rate	1/250
Vol. Lyse	520µl
Second dilution rate	1/300

Measurement	
Method	Impedance
Ruby diameter	80µm
Depression of count	200mb
Duration of the count	2x5 sec.

1.2. RBC/PLT

The RBC's and PLT's are measured by an electronic impedance variation principle. This means that an electronic field is generated around the micro-aperture within the chamber in which the blood cells are pulled through.

The sample is diluted with an electrolytic Diluent (electronic current conducting fluid), mixed then pulled through a calibrated micro-aperture. Two electrodes are placed on either side of the aperture and electric current continuously passes between the two electrodes.

As the blood cells pass through the aperture, they create resistance (Impedance) in the electronic field between the two electrodes. The voltage, which measures the cells, is proportional to the size of the cell. Since the current is constant and remains unchanged, the larger the cell is, the «more» resistance it has. The smaller the cell is, the «less» resistance it has.

These electronic voltages vary in pulse size as the cells pass through the aperture. The pulses are amplified, channeled according to size and threshold, grouped and then mathematically calculated along with the calibration coefficients to give a final numerical value for both RBC's and PLT's.

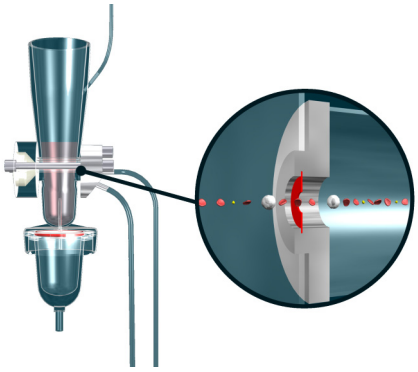


Fig.1: Impedance principle

◆Results

Number of cells counted per volume unit x calibration coefficient

◆Histograms

RBC:
Distribution curves on 256 counting channels from 30fl to 300fl.

PLT:
Distribution curves on 128 channels from 2fl to a mobile threshold.
This threshold moves according to the microcyte population present in the analysis area.

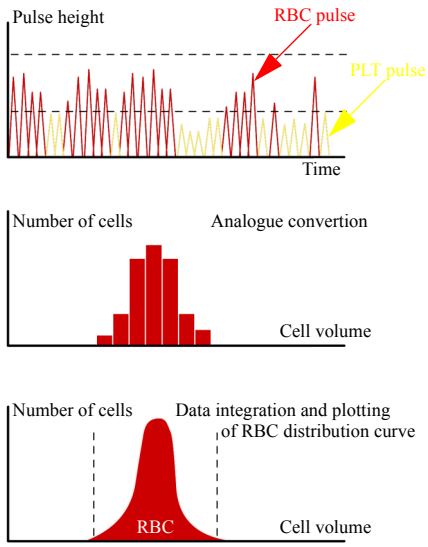


Fig.2: RBC distribution curve

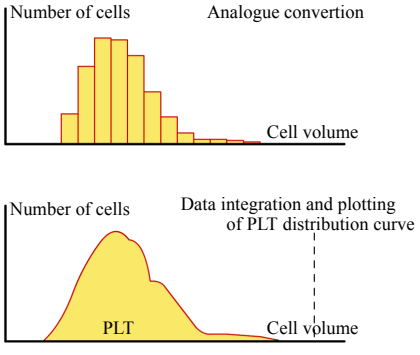


Fig.3: PLT distribution curve

◆ Technical characteristics for the RED BLOOD CELL and PLATELET count:

Dilution

First dilution volume used	30 µl
Vol. ABX DILUENT	2500 µl
Final dilution rate	1/15000

Measurement

Method	Impedance
Ruby diameter	50µm
Depression of count	200mb
Duration of the count	2x5 sec.

Results

Number of cells counted per volume unit x Calibration coefficient

1.3. Hemoglobin measurement principle

During the Startup cycle, an HGB blank test sequence including 2 blank measures is run. If the difference between these two measures is too important, a third measure is performed.

HGB reference blank sequence will be carried out prior to an analysis to come. If the operator:
- Has left system more than 10 minutes after analysis.
- Has not carried out the Startup cycle after switching on the system.

Every cycle, an HGB blank is carried out on diluent and compared to the previous HGB blank analysis. Lyse reagent is added to the first dilution in the WBC/HGB chamber.

◆ Lyse

This reagent contains potassium ferricyanide [Fe(CN)]K and potassium cyanide [KCN].
The hemoglobin freed by the lysis of the red blood cells combines with the potassium cyanide to form the chromogenous cyanmethemoglobin compound.
The compound is then measured by spectrophotometry, through the optical part of the WBC/HGB chamber, with a wave length of 550 nm.

◆ Technical characteristics for the measurement of the hemoglobin:

Dilution

Initial blood volume	10 µl
Vol. ABX DILUENT	2500 µl
First dilution rate	1/250
Vol. Lyse	520µl
Second dilution rate	1/300

Measurement

Method	Photometry
Wavelength	550nm

Result

Absorbance value obtained x coefficient of calibration

1.4. Hematocrit measurement principle

The height of the impulse generated by the passage of a cell through the micro-aperture is directly proportional to the volume of the analyzed RBC.
The hematocrit is measured as a function of the numeric integration of the MCV.

1.5. RDW calculation

The RDW (Red cell Distribution Width) is used to determine erythrocyte abnormalities linked to Anisocytosis. The RDW will enable the user to follow the evolution of the width of the curve in relation to the cell number and average volume.
The RDW is also a calculation from the RBC histogram, as follow:

$$RDW = \frac{KSD}{MCV}$$

K = system constant
SD = Determined standard deviation according to statistical studies on cell distribution.
MCV = Mean Corpuscular Volume of erythrocytes

1.6. MCV, MCH, MCHC calculation

- MCV (Mean Cell Volume) is calculated directly from the entire RBC histogram.

- MCH (Mean Corpuscular Hemoglobin) is calculated from the HGB value and the RBC count.
  The Mean HGB weight in each RBC is given by the formula:
  MCH (pg) = HGB/RBC x 10

- MCHC (Mean Corpuscular Hemoglobin Concentration) is calculated according to the HGB and HCT values.
  The Mean HGB concentration in the total volume of RBC is given by the formula:
  MCHC (g/dL) = HGB/HCT x 100

1.7. Measuring the MPV:

MPV (Mean Platelet Volume) is directly derived from the analysis of the platelet distribution curve. The MPV is expressed in µm3 or fl.

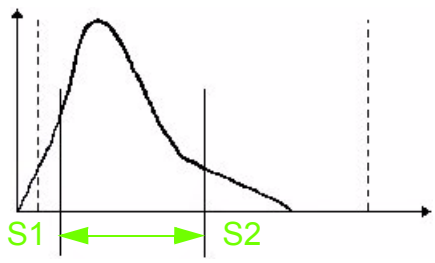
1.8. Calculating the PCT:

Thrombocrit is calculated according to the following formula:

$$PCT\% = \frac{PLT(10^3/\mu L) \times MPV(fL)}{1000}$$

1.9. Calculating the PDW:

This count is derived from the platelet curve.
PDW (Platelet Distribution Curve)= Width of the curve between 15% of the number of platelets starting from 2 fl (S1) and 15% of the number of platelets beginning with the variable top threshold (S2) as shown on next diagram:



1.10. CRP measuring principles

1.10.1. CRP count principles

Measurement

Same as the hemoglobin measurement principle, it is a spectrophotometric absorbance measurement (Turbidimetry) of the C-Reactive protein after 2 dilutions.
This measurement is performed in CRP Chamber.

◆ Technical characteristics for the CRP count:

Dilution #1

Initial blood volume	8 µl
Vol. ABX CRP REA-R1 (Saponin)	100 µl
Fisrt dilution rate	8/100
Total time for reaction	60 sec.

Dilution #2

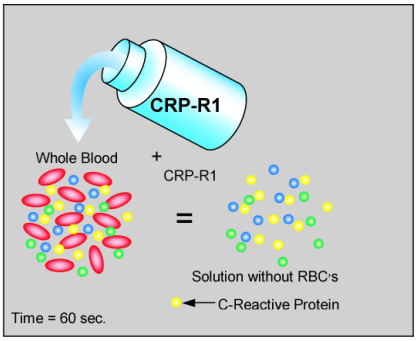
Dilution #1	108 µl
Vol. ABX CRP REA-R2 (Buffer)	100 µl
Vol. ABX CRP REA-R3 (Latex)	200 µl
Final dilution rate	2/100
Incubation time	20 sec.

Measurement

Method	Photometry
Wavelength	850nm
Measurement duration	60 sec.

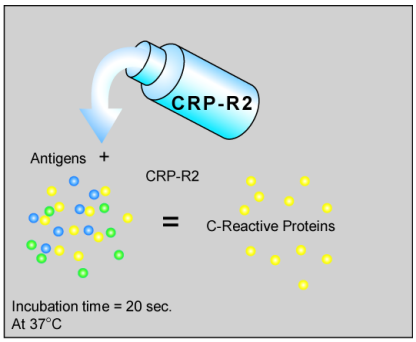
1.10.2. CRP Reagent principles:

ABX CRP REA-R1 Hemolysis reagent on whole blood lyses RBC:



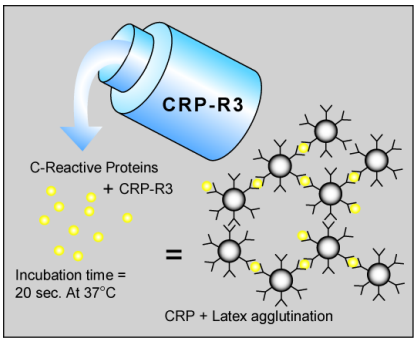
After lyse of RBC, antigens are still present in the solution.

ABX CRP REA-R2 buffer reagent inhibits all different antigens, except C-Reactive protein:



Only C-Reactive proteins are present in the solution.

ABX CRP REA-R3 latex reagent agglutinates C-Reactive proteins around Latex balls:

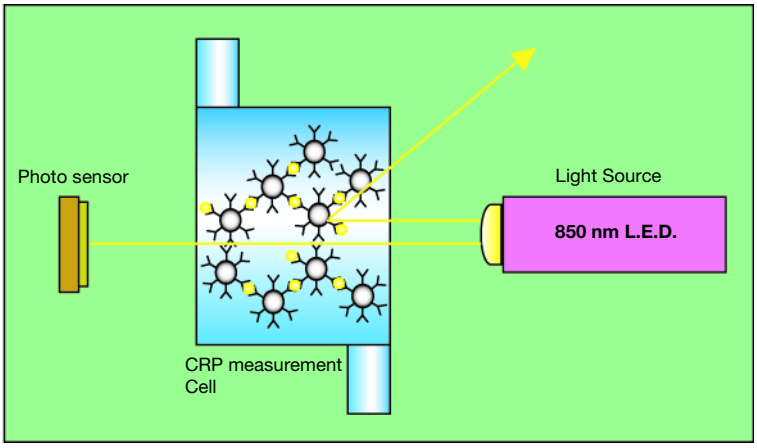


Agglutinations of C-Reactive proteins and Latex are ready to be measured.

1.10.3. CRP Measurement principle:

Absorbance measurement:

C-Reactive proteins and Latex agglutinations are measured by spectrophotometry through the optical part of the CRP chamber with a wavelength of 850nm:



First measurement is performed after 20 sec, Then 1 measure each 10s for a total of 7 measurements.
The first absorbance measurement at 20 sec. is used to trigger two different flags:

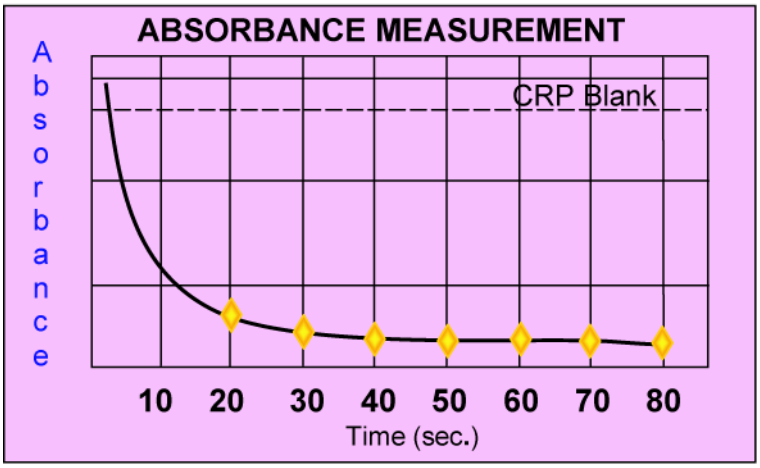
--.- on display (--.-E on printer) means that Diluent has ran out (dilution is too low);

EE.E on display (--.-P on printer) means that CRP value is in Prozone.

In any case the cycle will be ended.

1.10.4. CRP Calculation:

ABX Micros CRP 200 calculate absorbance for each measure:

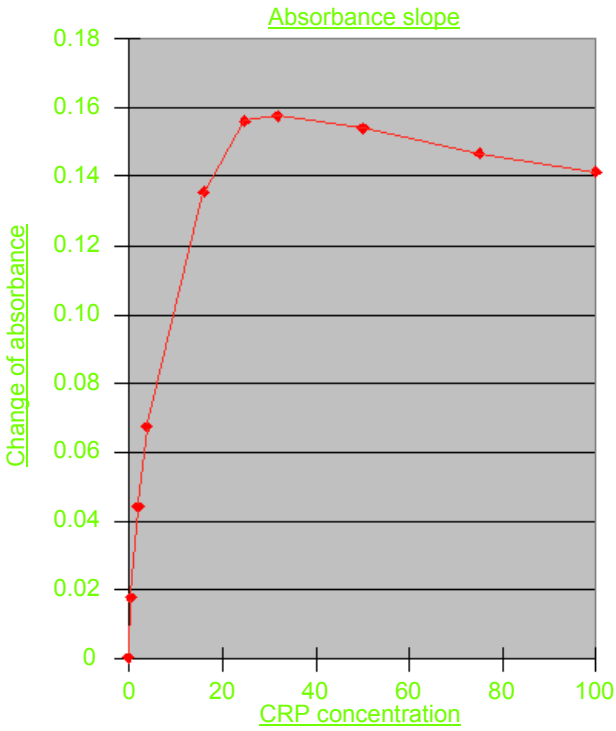


Each absorbance is compared to a «CRP Blank Value» wich measurement is from diluent.

$$\text{Absorbance Log} = \frac{\text{Blank measurement}}{\text{Measured Value}}$$

1.10.5. CRP calibration curve

Absorbance slope are calculated between two following absorbance measures.
Absorbance slope average will give C-Reactive protein concentration by projection onto CRP Calibration curve



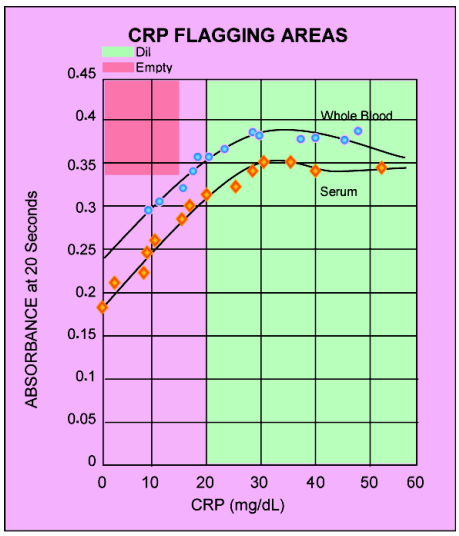
1.10.6. CRP flagging areas

Dil:

After the first 20 seconds of the reaction, if the CRP concentration is over 20 mg/dL, the CRP display window will display «EE.E» and «--.-D» on the printed report. The flagging diagram is used to illustrate the reaction curve of the CRP concentration when it is above the upper limit of the assay 20 mg/dL.
Note the difference in the reaction curves between serum and whole blood.

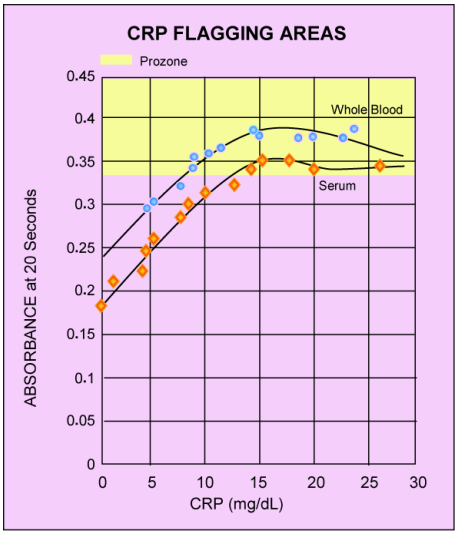
Empty:

When a known CRP concentration value is under 15mg/dL, and the absorbance, at the first 20 seconds of the reaction, is over the HCT x Coefficient, the CRP display window will display «**--.--**» and «**--.-E**» on the printed report.



Prozone:

After the first 20 seconds of the reaction, if the absorbance is over the absorbance threshold, the CRP display window will display «EE.E» and «--.-P» on the printed report. Readings in the Prozone area should not be considered accurate. If this flag appears on the printed report, dilute the sample and re-analyze it. If the diluted result is still abnormal, other laboratory reference methods may be needed to obtain an accurate CRP result on these types of specimens.



1.10.7. CRP final calculation

The final CRP concentration results is determined by the following formula:
CRP = CRP curve x Calibration Coefficient x CRP Reagent Sensitivity Factor x HCT coeff.

- CRP Curve: this is the slope data obtained during the antigen/antibody reaction-counting period.
- CRP Calibration Coefficient: this is the value obtained when performing the CRP Calibration.
- CRP Reagent Sensitivity Factors: those factor numbers are noted on each ABX CRP REA reagent kit.
- HCT Coefficient: this is the Hematocrit value obtained from a whole blood sample or from the conversion table when running whole blood CRP dilutions.

Software versions

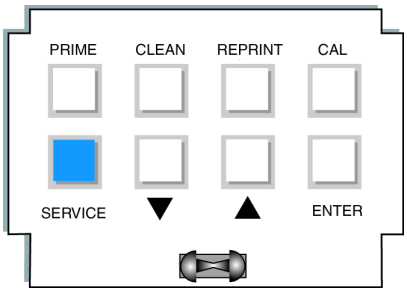
CONTENTS:

1. Software overview

1.1. User menu overview:

In order to access to the special functions, follow the procedure below:

- Check that the instrument is in ready mode.
- Press and hold the Service key (blue).
- Using the Up and Down keys, set up the ten number of the required function on the WBC display, then press Enter.
- Keep holding the blue Service key and set up the unit number using the Up and Down keys. Press Enter when the required unit number is selected.
- Release the blue Service key.



«F0» Data saved and QC calculation

N°	Function	Details	WBC	RBC	HGB	HCT	PLT
F01	Display all saved data	Sample number, year, hour and minute are displayed first. Press the Enter key, the results are displayed	Year	Month	Day	Hour	Minute
F02	Printout all saved data	All saved data of measurement are printed out					
F03	Printout saved QC (CBC) data	Saved QC(CBC) data and calculated values (AVE, MIN, MAX, CV) are printed out					
F04	Printout saved QC (CRP) data	Saved QC(CRP) data and calculated values (AVE, MIN, MAX, CV) are printed out					
F05	Delete all saved data	All the saved data of measurement samples are deleted					
F06	Delete saved QC (CBC) data	Saved QC(CBC) data are deleted					
F07	Delete saved QC (CRP) data	Saved QC(CRP) data are deleted					

«F1» Miscellaneous Cycles

Displayed in the «N°» Window:

N°	Function	Details
F11	Backflush	Applies back pressure on the counting apertures.
F12	Drain chamber	Drains all counting chambers.
F13	Prime Diluent	Primes the ABX Minidil LMG into the system.
F14	Prime lyse	Primes the ABX Lyse into the system.
F15	Prime Cleaner	Primes the ABX Cleaner into the system.
F16	Bleach Clean (CBC)	Used to remove protein buildup and fibrin clots.
F17	CRP prime	Primes the ABX Minidil LMG into the CRP flowcell.
F18	Complete Rinse cycle	Rinses the fluidic system with ABX Minidil LMG.

«F2» Mechanical Cycles

Select a number within a display window by using the Up or Down arrow keys, and then press the Enter key to accept the change and move to the next display window and/or exit the menu.

N°		Details	WBC	RBC	HGB	HCT	PLT
F21	Sensors	The status of sensors are displayed as «1» or «0». Manually move the parts to check that the sensors are turned ON/OFF properly	Sample needle 0= Down 1= Up	Sample Carriage 0= Back 1=Forward	Liquid syringe 0= Down 1= Up	Vacuum/ Waste syringe 1= Down 0= Up	CRP syringe 0= Down 1= Up
F22	Sample needle Up/Down	By pressing the Enter key, the needle is moved down to the lowest position and the Busy LED starts blinking. By pressing the Enter key again, the needle is moved up to home position					
F23	Carriage Left/Right	By pressing the Enter key, the carriage is moved to the WBC chamber pos., and the Busy LED starts blinking. By pressing the Enter key again, the carriage is moved forward to home position.					
F24	Liquid syringe	By pressing the Enter key, the liquid syringe is moved up to the highest pos.(home) and the Busy LED starts blinking. By pressing the Enter key again, the liquid syringe is moved down to the lowest position.					
F25	Vacuum / Waste syringe	By pressing the Enter key, the Vacuum/ Waste syringe is moved up to the highest position (home) and the Busy LED starts blinking. By pressing the Enter key again, the Vacuum/Waste syringe is moved down to the lowest position.					
F26	Valves	Check that the valves are opened/closed. The valve N° being checked is displayed on WBC display in order.	Vaves N°				
F27	Park system	The syringes and needle are moved to the transfer position. After running F27, turn the power OFF.					

N°		Details	WBC	RBC	HGB	HCT	PLT
F28	Door & tube holder sensor	Check the status of the door and Tube holder sensors. The status of sensors are displayed as «1» or «0». Press the Enter key to finish F28. The Ready LED lights up.	Door 0= Close 1= Open	Sensor 1 (upper) 0= Off 1= On	Sensor 2 (middle) 0= Off 1= On	Sensor 3 (lower) 0= Off 1= On	
		Control blood:		0	1	0	
		Vacuum sample tube		0	0	1	
		Micro sample tube		0	1	1	
		Mini sample tube (Microtainer)		1	0	1	
F29	CRP syringe	By pressing the Enter key, the CRP syringe is moved down to the lowest position and the Busy LED starts blinking. Press the Enter Key again, the CRP syringe is moved up to the highest position (home).					

«F3» Setup Menu

Select a number within a display window by using the Up or Down arrow keys, and then press the Enter key to accept the change and move to the next display window and/or exit the menu.

N°	Function	Details	WBC	RBC	HGB	HCT	PLT
F31	Date Format	Select a setting format	0 = MMDDYY 1 = DDMMYY 2 = YYMMDD 3 = YYDDMM				
F32	Date/Time adjust.	Set year, month, day, hour, and minute	YY	MM	DD	HR	MIN
F33	Cleaning frequency	The number of analysis required for next autoclean can be set up in range of 1 to 100	0 = Never 1 = (1 - 100)				
F34	Units	Select a unit	0 = Japan STD 1 = SI 2 = Standard 3 = Inter 2				
F35	Serial Output / RS232	Select a format of RS-232C output	0 = Trans. Off 1 = Internal ABX 1 2 = Standard 3 = Internal ABX 2				
F36	Printer parameters 1	Select a printer format. The printer must be turned ON.	Second Copy 0 = No 1 = Yes	Print Limits 0 = No 1 = Yes	Printers 0 = None 1 = Epson 2 = Seiko 3 = Standard	Print Histo. 0 = No 1 = Yes	
F37	Print setup	Printout of the instrument configuration					
F38	Printer parameter 2	Select the printout of WBC 3 Diff data Set «1».	Print LMG results 0= No 1= Yes				

If you bypass the menu that you want to modify and/or miss a step sequence when selecting a sub-menu function, you must do the following:

- Re-enter the Menu functions by pressing and holding the blue Service key.
- Re-select the sub-menu within the menu that you have selected by using the Up or Down arrow keys.
- Press the Enter key before releasing the blue Service key.
- Carefully make your selection in the display windows by using the Up or Down arrow keys, and then press the Enter key to accept the change and move to the next display window and/or exit the menu.

«F4» Laboratory Limits

Select a number within a display window by using the Up or Down arrow keys, and then press the Enter key to accept the change and move to the next display window and/or exit the menu.

N°	Function	Details	WBC	RBC	HGB	HCT	PLT	CRP
F41	Low Limits (CBC)	Set up the low limits.	WBC	RBC	HGB	HCT	PLT	
			MCV	MCH	MCHC			
F42	High limits (CRP/CBC)	Set up the high limits.	WBC	RBC	HGB	HCT	PLT	CRP
			MCV	MCH	MCHC			
F43	PLT alarm adjustment	Set up the threshold of PLT flag.	SCL	SCH	MIC			
F44	Low limits (LMG)	Set up the low limits of LMG.	LYM% LYM#	MON% MON#	GRA% GRA#	MPV *PCT	RDW *PDW	
F45	High limits (LMG)	Set up the high limits of LMG.	LYM% LYM#	MON% MON#	GRA% GRA#	MPV *PCT	RDW *PDW	
F46	LMG alarms adjustment	Set up the threshold of flags.	L1	M2	G1	G3		

*: PCT and PDW are not used in the United States. These parameters are strictly used for investigational and research purposes only.

1.2. Technician Menus Overview

In order to access to the technician functions, follow the procedure below :

- Press and hold the Service key (blue). Using the Up and Down keys, set up the ten number of the required function on the WBC display, then press Enter.
- Keep holding the Service key (blue) and setup the unit number using the up and down keys. Press the Enter key when the required unit number is selected.

_ To access a function from F60 to F98, Press the Up and Down key while simultaneously pressing the Service key and the Mode key.

- Release both keys.

F5 Technician 1 (needle adjustment)

N°	Function	Details	WBC	RBC	HGB	HCT
F51	Needle depth adjustment See "3. Needle heigth adjustment, page 4"RAS261	Locate the tip of the needle to the right side of the WBC chamber, then press the Enter key. The Up/Down position is automatically adjusted.	Value			
F52	Enter needle value	Enter the pulse count of needle Up/ Down value over WBC chamber.	1000 Units	100 Units	10 Units	1 Units

N°	Function	Details	WBC	RBC	HGB	HCT
F53	Needle & carriage check See "4.2. Adjustment Check, page 5"RAS261	Position check of the needle Up/Down and Backward/Forward over the WBC chamber.				
F54	CBC carriage adjustment See "4.1. Adjustment, page 5"RAS261	Set the needle tip position to the one thirds position from the right side of the WBC chamber and press the Enter key. The Backward/Forward position is automatically adjusted.	Value			
F55	Enter CBC carriage value See "4.2. Adjustment Check, page 5"RAS261	Enter the pulse count of the needle Backward/Forward over the WBC chamber	1000 Units	100 Units	10 Units	1 Units
F56	CBC & CRP carriage adjust. See "5. Needle and carriage location over CRP chamber adjustment, page 6"RAS261	Locate the tip of the needle to the right side of the CRP mixing chamber and press the Enter key. The Backward/Forward position is automatically adjusted.	Needle value	Carriage value		
F57	CBC & CRP carriage check See "5. Needle and carriage location over CRP chamber adjustment, page 6"RAS261	Position check of needle Backward/ Forward over the CRP mixing chamber.				
F58	Enter CRP needle value See "5. Needle and carriage location over CRP chamber adjustment, page 6"RAS261	Enter the pulse count of needle Up/ Down over the CRP mixing chamber.	1000 Units	100 Units	10 Units	1 Units
F59	Enter CRP carriage value See "5. Needle and carriage location over CRP chamber adjustment, page 6"RAS261	Enter the pulse count of the needle Backward/Forward over the CRP mixing chamber	1000 Units	100 Units	10 Units	1 Units
F5A	CRP R2 needle adjust. See "6. Needle and carriage location over CRP-R2 reagent chamber adjustment, page 7"RAS261	Enter the auto-adjustment of the CRP reagent depth. - The CRP cover opens - Move the carriage to the CRP R2 position - Locate the tip of the needle on the side of the drain hole - Press the Enter key - The pulse count is displayed - Press the Enter key (completed)	Value			
F5B	Enter CRP R2 needle value See "6. Needle and carriage location over CRP-R2 reagent chamber adjustment, page 7"RAS261	Enter the pulse count of the needle Up/ Down over the CRP mixing chamber	1000 Units	100 Units	10 Units	1 Units
F5C	Carriage holder adjust. See "1. Carriage sampling location adjustment, page 2"RAS261	Enter the auto-adjustment of forward/ backward position of sample aspiration - The Busy LED start blinking - Locate sample holder's smallest hole in sampling position - Close the sampling door - Locate the needle in the center of the smallest hole and press the Enter key - The pulse count is displayed	Value			
F5D	Enter carriage holder value See "1. Carriage sampling location adjustment, page 2"RAS261	Enter the pulse count of the needle forward/backward position of sample aspiration	Value			

F6 Technician 2

N°	Functions	Detail	WBC	RBC	HGB
F61	Needle sensor adjustment See "2. Needle home adjustment, page 3"RAS261	Locate the tip of the needle at the same level as the bottom of rinsing block, then run F61. The pulse count from this position to the needle home position is displayed on RBC display. Adjust the position of the needle home sensor until the values becomes 70+/-5.		70 +/- 5	
F62	HGB blank adjustment: See HGB blank adjustment values table below See "8. HGB photometer adjustment, page 8"RAS262	The current channel is displayed on HGB display. By means of R97 on Main board, adjust the HGB channel according to the room temperature using the «HGB blank adjustment value» chart.			Value
F63	Aperture current adjustment See "6. Aperture voltage check, page 6"RAS262	Check the voltage between TP19 and TP31. Press Enter key to measure the aperture voltage. It must be between 58.5 and 62.8V.			
F64	WBC latex adjustment See "9. WBC latex adjustment, page 9"RAS262	Run the WBC latex adjustment - Value blinking in WBC display shows the LYM target, depending of latex lot used, usually 57+/-1. - Press the Enter key. - Value blinking in RBC display shows the GRA target, depending of latex lot used, usually 180+/-2. When values are stable, adjust gain by mean of R74 on Main board.	LYM	GRA	
F65	RBC / PLT latex adjustment See "10. RBC/PLT latex adjustment, page 10"RAS262	Run the RBC/PLT latex adjustment - Value blinking in WBC display shows the RBC target, depending of latex lot used, usually 74+/-1. - Press the Enter key. - Value blinking in RBC display shows the PLT target, depending of latex lot used, usually 64+/-2. When values are stable, adjust RBC gain by mean of R81 on Main board and PLT gain by mean of R87.	RBC	PLT	
F66	Bubbling See " RAS264: Bubbling adjustment	Two bubbling phasis are adjustable: - Bubbling 1 is the first dilution (WBC/HGB chamber) bubbling value - Bubbling 2is the second dilution (WBC/HGB chamber + lyse) bubbling value (do not change).	130 +0/-20	100 +0/-10	
F67	Temperature (T°) adjustment See " RAS265: Thermic adjustment	More than 1 hour after turning ON the power, run F13 twice (Prime Diluent), then run F67. T° is displayed on WBC display. By means of Up and Down keys, input the T° read on thermometer, then press the Enter key.	Value		

N°	Functions	Detail	WBC	RBC	HGB
F68	Temperature (T°) check See " RAS265: Thermic adjustment	Run F13 twice (Prime Diluent), then run F68. As calibration, 2°C is automatically added to the T° input for T° adjustment. T° without correction is displayed on WBC display. Corrected T° is displayed on RBC display. Check T° between RBC display and thermometer then press the Enter key.	Not calibrated	Calibrated	
F69	Pressure check See " RAS263: Vacuum check	Connect a Barflex to the secong input of the Waste/Vacuum syringe. Press the Enter key. Vacuum must be within the following range: from +220 to +190 mb. Wait for 30s, the vacuum drop down must be less than 2 mb.			

HGB blank adjustment values:

Temperature room	Channel		
	Mini	Nominal	Maxi
15	240	245	250
16	240	245	250
17	239	244	249
18	238	243	248
19	237	242	247
20	236	241	246
21	235	240	245
22	234	239	244
23	234	239	244
24	233	238	243
25	232	237	242
26	231	236	241
27	230	235	240
28	229	234	239
29	228	233	238
30	228	233	238
31	227	232	237
32	226	231	236
33	225	230	235
34	224	229	234
35	223	228	233

F7 Technician 3 (Set up and display)

N°	Function	Detail	WBC	RBC	HGB	HCT
F71	Operating mode	Factory use only Must be set to «0»	0:User 1:Control			
F72	Serial number	Instrument serial N° is displayed	1000 Units	100 Units	10 Units	1 Units
F73	Startup number	N° of Startup cycles is displayed	1000 Units	100 Units	10 Units	1 Units
F74	Stand by number	N° of Shutdown cycles is displayed	1000 Units	100 Units	10 Units	1 Units
F75	Cycle number	N° of analysis cycles is displayed	1000 Units	100 Units	10 Units	1 Units
F76	Burn in cycle number	N° of Burn-in cycles is displayed	1000 Units	100 Units	10 Units	1 Units
F77	Burn in	Start Burn-in cycle When stopping it, turn OFF the power	Burn in cycle number			
F78	LED & Displays check	Check the LED display. Press the Enter key, all LEDs light up at once. Press again the Enter key, the LED light up in order.				
F79	Board type check		0:8p 255:16/18p			

F8 Technician 4 (Tube holder)

N°	Function	Detail	WBC	RBC	HGB	HCT
F81	Automatic adjustment See “7. Needle depth adjustment, page 8”RAS261	While the Busy LED blinks, set a tube and close the tube holder. Manually move the needle to the bottom of the tube by the Reagent door 2, then press the Enter key. Press the Enter key again to validate the setup.	Value			
F82	Position check See “7. Needle depth adjustment, page 8”RAS261	Position check of needle Up/Down over the sample holder				
F83	Not used					
F84	Change position 2 value See “7. Needle depth adjustment, page 8”RAS261	Enter the pulse count of needle Up/Down over a control vial.	1000	100	10	Units
F85						
F86	Change position 4 value	Enter the pulse count of needle Up/Down over a vacuum sample tube	1000	100	10	Units
F87	Change position 5 value	Enter the pulse count of needle Up/Down over a mini sample tube	1000	100	10	Units
F88	Change position 6 value	Enter the pulse count of needle Up/Down over a micro sample tube	1000	100	10	Units

F9 Technician 5 (CRP)

N°	Function	Detail	WBC	RBC	HGB	HCT	PLT
F91	CRP photometer adjust See "7. CRP blank adjustment, page 7"RAS262	Press the Enter key, then adjust VR1 on CRP board to have 3800+/- 50 on WBC display	Value				
F92	CRP 1 value adjust.	Do not change	0	2	6	8	4
F93	CRP 2 value adjust.	Do not change	0	0	8	0	2
F94	CRP 3 value adjust.	Do not change	0	2	5	9	5
F95	CRP 4 value adjust.	Do not change	- 0	4	0	0	0
F96	Cooler/heater check See "2. Diluent temperature in CRP chamber check, page 3"RAS265	Check the motor of switch ON/ OFF of cooler and heater	Heater 0:Off 1:On	Cooler 0:Off 1:On			
F97	Default values	Set the instrument parameters to default values.					
F98	System Config	Select the number of measurement items	#Param 0:16 Params 1:18 Params				
	CRP digits	Select the number of decimal digits of CRP		CRP DIGIT 0:1 Digit 1:2 Digits			

Alarm & error list

CONTENTS:

Display code type

Troubles that occur in the instrument include the following two types:

- Trouble not displayed by code:
  Trouble related mainly to the power supply (Details are described forward in this Chapter).

- Trouble displayed by code:
  Trouble displayed by code on the sample display unit on the front of the main body (Details are described forward in this Chapter)

1. Trouble not displayed by code:

Before concluding that the instrument has broken down, check the following points:
For whom of contact, see the back cover.

Instrument does not operate even if power is turned ON:

- Is the power cable connected ?
  Turn OFF the power switch, then connect the power cable.

- Is reagent door 2 open ?
  Close reagent door 2.

- Is the fuse blown ?
  Check the fuse holder at the back of the instrument referring to Section 07 Maintenance.
  Replace the blown fuse.

Key is not accepted:

- Is the instrument in the sleep state ?
  Press the Start up/Pause key to light up the Ready LED.

- Is reagent door 2 open ?
  Close reagent door 2.

- Is the error code displayed in the sample N°. display unit ?
  Take proper action after referring to paragraph «Error codes» further in this Chapter.

Failed to close the sample holder and it opened

The sample needle has stopped in the process of absorption. If the holder is closed in this state, the needle will be damaged. When the Ready LED lights up in about 50 seconds after pressing the Start up/Pause key, measurement can be performed again.

2. Trouble displayed by code

If the instrument detects trouble by self-diagnosis, the error code is displayed on the sample N°. display unit (Some errors are printed out as a message).

Printed error messages

1- Startup failed:
Indicates that the blank value from self-diagnosis after turning ON the power is not within the specified value. Content of the error and counter measures are the same as those for E15, E24, and E27.

2- Temperature error:
This is printed when the temperature of the ABX Minidil LMG is not within the temperature range of the measurement specifications. Use the instrument and reagents in the temperature range of 15 to 30°C.

Error code	Cause	Content	Actions
E1	Vacuum syringe does not return to home position in the specified time frame.	Vacuum syringe motor or position sensor is defective or has malfunctioned.	Power OFF. Wait 10 seconds. Power ON and press the Startup/ Pause key to run Startup.
E2	CBC Liquid syringe does not return to home position in the specified time frame.	Liquid syringe motor or position sensor is defective or has malfunctioned.	Power OFF. Wait 10 seconds. Power ON and press the Startup/ Pause key to run Startup.
E3	Sample needle carriage does not return to home in the horizontal direction during the specified time frame.	1 - Sample needle carriage still has the shipment retaining clip secured. 2 - Sample carriage motor or position sensor is defective or has malfunctioned.	1 - Power OFF, remove instrument cover, remove the black shipment clip from the lower movement guide rail. 2 - Power OFF. Wait 10 seconds. Power ON and press the Startup/ Pause key to run Startup.
E4	CRP Liquid syringe does not return to home position in the specified time frame.	Liquid syringe motor or position sensor is defective or has malfunctioned.	Power OFF. Wait 10 seconds. Power ON and press the Startup/ Pause key to run Startup.
E5	Sample needle does not return to home in the vertical direction during the specified time frame.	1 - Sample needle is bent. 2 - Sample needle carriage motor or position sensor is defective or has malfunctioned.	1 - Replace the sample needle 2 - Power OFF. Wait 10 seconds. Power ON and press the Startup/ Pause key to run Startup.
E7	Printer does not accept print signal from the instrument.	1 -Reprint key was pressed during a function or a cycle. 2 - Printer is turned OFF.	1 - Complete the function or cycle, and then press the Reprint key. 2 - Turn the printer power ON.
E8	Printer does not accept print signal (printer paper is run out)	No paper loaded when a result should be printed out or when the Reprint key is pressed	Restart sequence after 30 seconds, or press the Start/Pause key to reset error
E9	Printer does not accept print signal (printer is turned off)	Printer is not on line	Turn the printer On

Error code	Cause	Content	Actions
E10	Printer does not accept print signal (printer is busy)	The printer cable is disconnected when a result should be printed out or when the Reprint key is pressed	1- Connect the printer cable 2- Restart sequence after 30 seconds, or press the Start/Pause key to reset error
E11	Printer does not accept print signal (No is selected for printout format by F36)	No printer has been selected in F36 print format selection	Select printer appropriately in F36 print format selection
E12	Printer does not accept print signal (printer is turned off or is not connected)	1- The printer cable is disconnected when a result should be printed out or when the Reprint key is pressed 2- The printer power is Off when a result should be printed out or when the Reprint key is pressed	1-Connect the printer cable then restart sequence after 30 seconds, or press the Start/Pause key to reset error 2- Turn the printer power On then restart sequence after 30 seconds, or press the Start/Pause key to reset error
E13	The instrument does not recognize the position of the sample tube holder.	The tube holder was not positioned correctly when the tube holder door was closed.	1 - Press the Startup/Pause key, then press the Service key several times to open the tube holder door. 2 - Reposition the tube holder so that it locks into position and close the tube holder door.
E14	Position of the sample holder can not be recognized correctly	The tube holder was not positioned correctly when the tube holder door was closed.	1 - Press the Startup/Pause key, then press the Service key several times to open the tube holder door. 2 - Reposition the tube holder so that it locks into position and close the tube holder door.
E15	Blank value is out of range (WBC~PLT)	Blank value is higher than specified values: WBC: $0.3x10^3/\mu L$ RBC: $0.02x10^6/\mu L$ HGB: 0.3 g/dL HCT: 0.1% PLT: $10x10^3/\mu L$	Check reagent level Check ground Perform a Backflush cycle (F11) Perform a Bleach cleaning cycle (F16) Check bubbling
E16	Sample holder is open		Close sample holder
E17	Sample holder does not open	1- Sample holder does not open 2- Sample holder opens/ closes to fast or to low	1- Check solenoïd Remove any physical obstruction Check switches connections 2- Tighten or loose the «push» screw located behind the tube holder. Adjust the spring position.
E19	Startup unexecuted	Startup unexecuted	Run a Startup cycle

Error code	Cause	Content	Actions
E20	The instrument is waiting for printing to end	Measurement has been started though paper runs out during printout	Press online button: Sequence restarts after data transmission finishes and error message is cleared after current measurement is completed
E22	Diluent temperature sensor is disconnected or broken	Diluent temperature sensor is disconnected or open circuit is present	Replace liquid temperature sensor
E23	Diluent temperature sensor is broken	Diluent temperature sensor is defective	Replace liquid temperature sensor
E24	HGB blank value exceeds the specified value	HGB blank value is not within the range (between 180 and 255) though measured up to 3 times, or gap from previous value is more than 5.	Remove WBC and RBC black cover then check for bubbles in WBC chamber. Clean the chamber, put the cover back and run F62 function for blank measurement.
E25	Heater does not turn on/off in the specified time	Temperature is low. Wire of the heater is broken	Run F96 function 40 minutes after turning on the power and check that 0/1 is blinking in WBC/RBC windows. Check the connector of the heater Check the exhaust fan operation Replace the cooler
E26	Heater does not turn on/off in the specified time	Temperature is high. Cooler is in failure	Run F96 function 40 minutes after turning on the power and check that 0/1 is blinking in WBC/RBC windows. Check the connector of the heater Check the exhaust fan operation Replace the cooler
E27	CRP blank value exceed the specified value	CRP blank value is not within the range (between 3340 and 4014) Air bubbles in the flowcell Low intensity of CRP light source LED Too high needle position in mixing chamber may causes air bubbles during priming	Check blank value variation by F91. If variation width is 10 counts or more, air bubbles are present. Clean the flowcell or replace it. If checked values are ouside 3800+/-50 though no significant variations, make adjustment
A28	Diluent sensor	Diluent is not primed Connector is disconnected	Prime diluent Check the sensor connector
A29	Lyse sensor	Lyse is not primed Connector is disconnected	Prime lyse Check the sensor connector
A30	Cleaner sensor	Cleaner is not primed Connector is disconnected	Prime cleaner Check the sensor connector

Error code	Cause	Content	Actions
E31	Discharge error at (+) pressure on	While air syringe is pressed down and waste is discharged to the tank, discharge pressure does not rise	Check diluent level and prime Check air syringe for leakage Check valve 5 and its tubings
E32	Discharge error at (+) pressure off	Pressure remains high and does not return to atmospheric level	Check valve 5 and its tubings Check tube from air syringe to waste tank Check that waste tank is on atmospheric pressure level
E33	Discharge error at (-) pressure on	While air syringe is pulled and waste is discharged from RBC and CRP chambers, pressure does not drop	Check air syringe for leakage Check valves12, 13 and 18 are open Check diluent level and prime
E34	Discharge error at (-) pressure off	Pressure remains low and does not return to atmospheric level	Check valves12, 13 and 18 are closed Check tubings from chambers to valves
A35	Temperature is out of range	Temperature is out of the specified range	Use the instrument from 18 to 30°C
A36	CRP reagent blank is out of range	CRP reagent blank is out of range	Set CRP REA properly

CONTENTS:

1. Maintenance

1.1. Introduction

Customer maintenance has to be carried out according to the recommended frequency, after having attended a HORIBA ABX approved customer training course.
The system warranty may be affected if damage occurs after a non trained technician intervenes or if replaced spare parts and consumables do not come from a HORIBA ABX approved origin.

1.2. Daily customer maintenance

Only a Startup and a Shutdown are required at the beginning and the end of the day.
Those cycles are described in the User manual, Section 4 «Startup & sample analysis».

1.3. Weekly customer maintenance

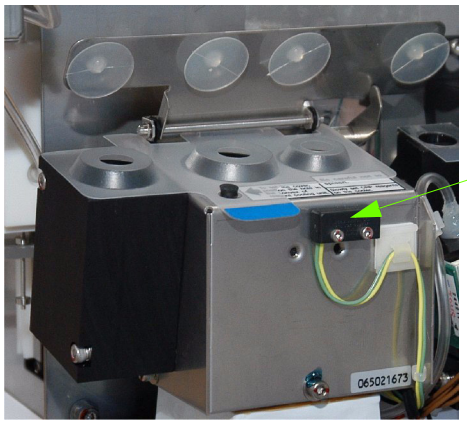
An overall check for cleanliness of the system is recommended every week.
Any traces of blood or reagent have to be wiped off as soon as possible using a piece of cloth and distilled water.

Never use solvent or abrasive cleaning material to clean the system.

1.4. Acces to the Technician functions

In order to access to the special functions, follow the procedure below:
- Check that the instrument is in ready mode.
- Press and hold the Service key (blue).
- Using the Up and Down keys, set up the ten number of the required function on the WBC display, then press Enter.
- Keep holding the blue Service key and set up the unit number using the Up and Down keys. Press Enter when the required unit number is selected.
- Release the blue Service key.

In order to work on the instrument and to run cycles without the cover, place a magnet over proximity sensor located on the reagent cooling unit.



2. Maintenance kit

Follow the RAS258 Yearly maintenance procedure for maintenance with XEA931AS kit. The kit includes:

Part number	Designation	Qty
FAA017A	O'RING, TANK MIN/AG+WASTE MIC	1
F0020373000	15x1,5 Nit. 70SH O'ring	1
FAA036A	O'RING, FLOW CELL+LYSE DISP.MIC	2
FAA046A	O'RING, COAXIAL CABLE	2
FAA053A	O'RING, SAMPL.NEEDLE MICROS OT	1
FAA055A	O'RING, MICROS SAMPLING SYRINGE	2
H1008304002	Liquid Syringe Diluent Piston	1
GBG275A	O'RING, APERTURE D=0.5 P60/P80	4

3. Procedures

- Maintenance and adjustments that need to be done on Micros CRP 200 are divided up into procedures according to the specific assemblies. This should make any update easier as all interventions can be carried out with the corresponding procedure on its own.
- Each procedure has to be read in full before beginning the intervention.

P/N and tittle	Concerns
RAS256: Installation	Unpacking - Micros CRP 200 installation - Reagent priming - Startup
RAS257: Decontamination & rinse	Instrument decontamination before maintenance
RAS258: Yearly maintenance	Yearly maintenance
RAS259: Check up after intervention	Check up after intervention
RAS260: Step by step analysis cycle	Described the analysis cycle step by step
RAS261: Needle & carriage adjustment	Needle & carriage position adjustment
RAS262: Main board & CRP board	Main & CRP boards adjustment (motor voltages, thresholds, gains, etc...)
RAS263: Vacuum check	Vacuum check
RAS264: Bubbling adjustment	Bubbling check
RAS265: Thermic adjustment	Thermic adjustment
RAS268: Front panel dismantling	Cover & front panel dismantling
RAS273: Autoconcentrated cleaning	Bleach cleaning
RAS445: CRP unit replacement	CRP unit replacement

Micros CRP 200

RAS256C

Installation

- Concerns
  - Installation kit
  - Reagents installation
  - Priming and startup
- Required tools
  - Hexagonal keys
- Required products
  - MICROS CRP Reagents: Bottles.
  - Waste container
- Intervention time
  - 1 hour
- Frequency
  -
- Specific kit or consumables
  - Installation kit:

- XEA911A

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Installation kit (XEA911A)

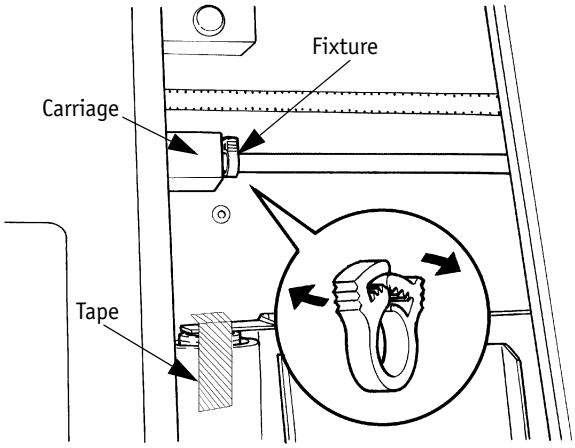
Ref.	Designation	QTY
DAR014A	Fuse 5x20 3.15A T 250V	2
EAE007A	Tygon tube 1.52mm (0.060")	2 ML
EAE009A	Tygon tube 2.29mm (0.090")	2 ML
FAA017A	O'RING, TANK MIN/AG+WASTE MIC	1
F0020373000	O'ring 15x1.5 NIT. 70SH	1
FAA036A	O'RING, FLOW CELL+LYSE DISP.MIC	2
FAA053A	O'RING, SAMPL.NEEDLE MICROS OT	1
FAA055A	O'RING, MICROS SAMPLING SYRINGE	2
GBG145A	Reagent straw cap D=20	1
GBG155A	Capsule D=25	1
GBC284A	Cleaner straw	1
GAK302A	Cap	1
XDA693A	Waste tubing P60	1
JAG003A	Plastic box	1
MAB001A	Bent key 2mm	1
MAB002A	Bent key 2.5mm	1
MAB003A	Bent key 1.5mm	1
MAB018A	Bent key 3mm	1
MAB069A	Screwdriver 2.5mm	1
MAB090A	Torx bent key T10	1
XEA019A	Grease KM1011	1
G0166911	Diluent straw + tube	1
G0166920	Waste straw for waste container	1
GBC285A	Waste straw for waste plastic bag	1
G0310450	CRP reagent protection cover	1
G0166861	Waste water tank	1
G0166940	Sample cup	20

2. Printer

Use the printer that is supplied or approved by HORIBA ABX. Do not use any printer that has not been recommended by a HORIBA ABX qualified technician.

3. Installation

3.1. Removing the fixture securing the carriage for transportation



- Open the reagent door 2.
- Move the fixture securing the carriage to the right.
- Shift the fixture horizontally with your thumb and index finger. Release the lock and remove the fixture.

Save the fixture since it is used for TRANSPORTATION.

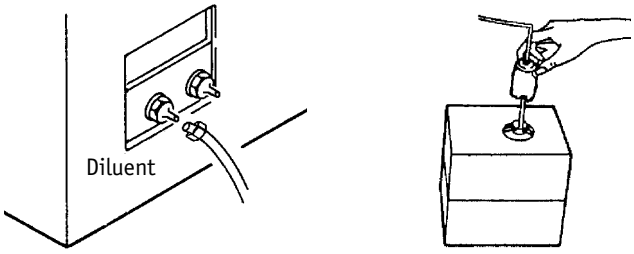
- Peel off the tape securing the reagent cooling unit and reagent cover (open/close).

When peeling off the tape, be sure that the reagent protection cover between the reagent cooling unit and the reagent cover (open/close) is correctly placed and is not damaged.

3.2. Installing the reagents

◆ ABX Minidil LMG

- Connect the connector end of the attached ABX Minidil LMG tube to the «Diluent» connector on the tube connecting block on the back of the instrument at the lower left.
- Attach the other end of the Diluent tube to the head of the attached Diluent 10L straw.
- Pull out the cap of the ABX Minidil LMG tank, open the cap, attach the Diluent straw and close cap of the straw.
- Open the remaining quantity check window at the lower side of the front of ABX Minidil LMG packing case.



◆ Tighten the screw of the connector firmly.

◆ Place the ABX Minidil LMG box at the same height as the main body.

◆ Do not bend the DILUENT tube. Do not have it cross a power line to avoid the effects of noise.

◆ The length of the tube should be no longer than 1.5 m (59 inch) and as short as possible.

◆ Do not apply force to the joint of the tube connecting block.

◆ Prevent dirt from getting into the reagent.

◆ The reagent and tube should not be exposed to direct sunlight.

ABX Lyse may contains cyanide. Handle it carefully.

◆ ABX Cleaner and ABX Lyse

- Open the reagent door 1.
- A Lyse straw (A) and a Cleaner straw (B) are already installed (See "Fig.1: Reagent straws, page 4").

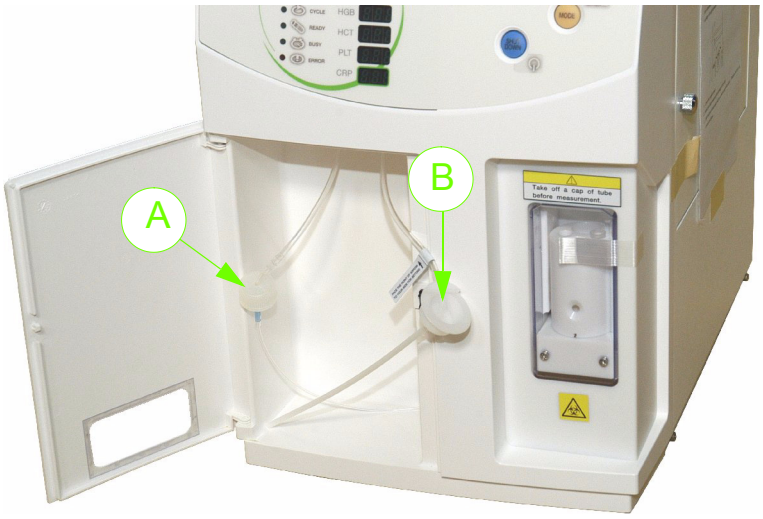
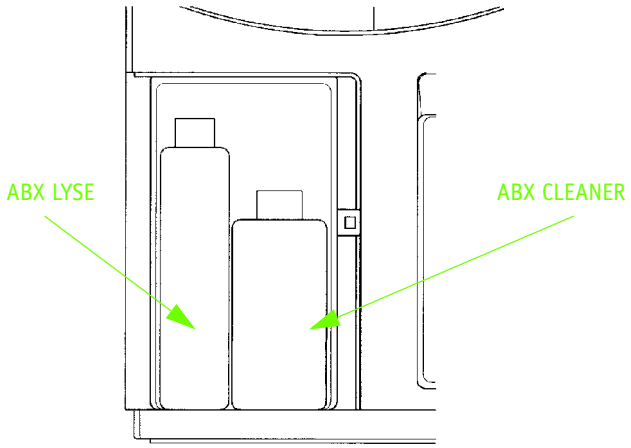


Fig.1: Reagent straws

- Remove those straws.
- Connect the straws delivred with the instrument (in the installation kit) on the tubings (the tubing with the label for the Miniclean straw)
- Open the caps on the ABX Cleaner and ABX Lyse bottles.
- Plunge the straws in the bottles then screw the caps.

- Set the ABX Cleaner on the right side of reagent door 1.
- Set the ABX Lyse to the left of the ABX Cleaner.

Be careful not to bend the tube when positioning the reagents.

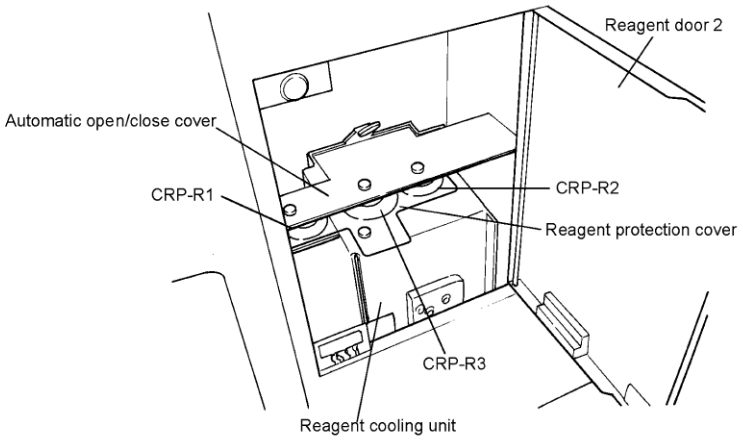


3.3. Installing ABX CRP REA

To enter the CRP reagent sensitivity factors, please refer to RAS259, "4.3.Input of the CRP reagent sensitivity factors, page 6".

- Install the ABX CRP REA only when measuring CRP.
- This instrument is not provided with a function for checking the remaining quantity of CRP reagent. The remaining quantity of ABX CRP REA should be checked visually. When the remaining quantity decreases to below the lower portion of the CRP-R3 reagent label, replace all three reagents.

- Take the ABX CRP REA (CRP-R1, CRP-R2 and CRP-R3) out of the refrigerator.
- Push the lower front portion of the reagent door 2 on the main body side and open reagent door 2.
- Invert CRP-R3, 2 times. Be sure to remove the cap and slowly set it in the reagent cooling unit. Similarly, be sure to remove the cap of CRP-R2 and set it in the cold room.
- Slowly set CRP-R1 in the R1 reagent holder.

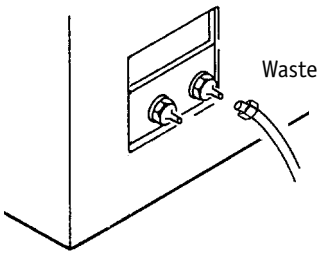


- This instrument is not provided with a cap detecting function. Therefore, be sure to remove the CRP-1, CRP-2 and CRP-3 reagent bottle caps before setting the bottles in the instrument.
- The reagent should be refrigerated, 2 to 10°C (35.6° to 50 °F), storage in a freezer is prohibited. After completion of measurement, take the reagent out of the reagent cooling unit, tighten the cap firmly and store in a refrigerator.
- Be careful not to misplace the cap.
- Set the reagents in the instrument slowly. If the reagent container is dropped in the reagent cooling unit, the liquid will spill, so care must be taken.
- After the reagent is set, be sure to close the reagent door.
- CRP-1 is stable even at room temperature. Accordingly, it is designed not to be placed in the reagent cooling unit. However, it should be stored in the refrigerator the same as the other reagents.

3.4. Installing the waste liquid tank

- Waste liquid may contain cyanide. Handle it carefully. Never ingest the waste liquid as it may contain biological residual substances (infectious substances).
- Always follow the recommended procedures for waste disposal. Never connect the instrument wastes directly to the laboratory drain pipes. For each waste container, follow the neutralization procedure (See User manual, Section 7, Maintenance and troubleshooting).

- Connect the waste container using the cristal tube 3x6 on the waste output, and place the waste container below the instrument level (under the bench).



- Insert the other side of the waste tube deeply into the cap head of the attached waste container.
- Remove the cap of the waste container and mount a cap with waste tube.

- Waste liquid tank is not provided with an overflow detecting function. When the quantity of waste liquid exceeds half of the tank, dispose of the liquid (See User manual, Section 7, Maintenance and troubleshooting).
- Be sure to use waste liquid tank cap. If the tube is directly inserted into the waste liquid tank, the pressure will cause the instrument to malfunction.

- Tighten the screw of connector firmly.
- Install the waste liquid tank at the same height as, or lower than the main body.
- Use an attached waste tube (3x6, 1.5m). Do not bend it.
- Do not apply force to the joint of the tube connecting block.

3.5. Wiring between the power source and the ground

To avoid electric shock, connect the power cable only to a hospital grade socket outlet.

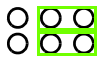
- Check if the power switch on the left side of the instrument is OFF.
- Insert the attached power cable into the socket on the rear of the instrument.
- Connect the 3-pin plug of the power cable into the oulet of 100-240V AC with 50 or 60 Hz.

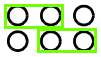
- Place the instrument where an independent outlet can be used.
- Use an outlet different from the one used by a device which easily generates noise such as a centrifuge.
- When placed on a metal table, ground it as well.

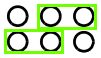
3.6. Setting the language

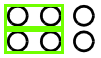
Make sure the instrument is OFF, then configure the jumper E1 on the Main board:

- E1 jumper configuration (language setting):


Japan


United States (no display with Hemalink)


English


Japan

3.7. Priming the reagent at installation

- If the power is supplied when the reagent is not primed in the tube (the condition at unpacking), error code E-6, E-15 etc. (refer to section 7) may occur frequently. Be sure to prime the reagent at installation.
- Before turning ON the power, be sure to check that the reagent and waste liquid tank are correctly installed and tubing is connected.

- Press PUSH on the top of the instrument and open the upper door.
- While pressing the Service key, set the power switch to ON (Error code E-19 will be displayed. This code indicates startup in the service mode).
- When F1 is displayed on the sample display unit, release the Service key. By releasing the Service key, the F1 display turns to N° [1] and the input Ready LED will light up.
- Press the Prime key. Reagent (ABX Minidil LMG, ABX Lyse and ABX Cleaner) will be primed into the instrument.
- Repeat previous step three times.
- When priming has been performed three times, perform «End Cleaning» by pressing the Shutdown key and turn off the power.

Micros CRP 200

RAS257C

Decontamination & rinse

- Concerns
  - Instrument decontamination before maintenance operation in the following cases:
  - Instrument removed from a biohazardous area
  - Maintenance intervention on contaminated assemblies and instrument rinse
- Required tools
  - Hexagonal keys
  - Clamps
  - Flat screw driver
  - Torx keys
- Required products
  - Fungicidal, bactericidal, virus killing detergent spray, non corrosive for metals,non plastic altering.
  - Bleach solution 12°Cl
  - Deionized water
  - Absorbant paper
  - Distilled water
- Intervention time
  - 1h30min
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Preparation (20min)

- Switch on the instrument.
- Run a Startup cycle, then a Clean cycle.
- Switch off the instrument and remove the supplying cable.
- Open the instrument cover.
- Spray the bactericidal cleaner on all assemblies that may provide biologic risks and wait for 10 minutes (assemblies in contact with the operator such as instrument cover, tube holder, keyboard, start key, sampling needle neighboured assemblies).

2. Manual decontamination (20 min)

- Remove the chambers cover.
- Dilute the 12°cl bleach to 1 part of bleach for 4 of deionize water (1/5).
- Instrument environment must be cleaned and decontaminated.
- No sponge, nor cloth must be used. Only absorbant paper, thrown after use, in contamination bins, can be employed. For small or weak assemblies use accurate drier papers.
- All assemblies that is suspected to have contact with biologic product must be disinfected with the diluted bleach (the stainless steel must be bleached below 30°Celsius).
- Blood stains or salt marks must be cleaned with spray detergent first.

Concerned assemblies:

- Outer surfaces of the instrument (perpex, covers, LCD, reagent locations....)
- Keyboards
- Waste connector plug
- Liquid valve push
- Needle neighboured assemblies
- Tube holder assy
- Overflow trays

- Reinstall all the assemblies and setup the instrument in its initial configuration.

3. Analysis circuit decontamination (30 min)

- Prepair 1 bottle containing 1/2 litre of bleach diluted to 1 part of bleach for 9 parts of deionize water (1/10).
- Prepair 1 bottle containing 1/2 litre of distilled water.
- Switch on the instrument.
- Replace the reagent bottles by the diluted bleach bottle.
- Run a Prime cycle.
- Fill a sample tube with diluted bleach to 1 part of bleach for 4 of deionize water (1/5).
- Run F[76] function: Prime cycle number.

- Enter 15 burn-in cycles (1 in HGB display and 5 in HCT display) press Enter to exit function (See "Fig.1: Display, page 3").

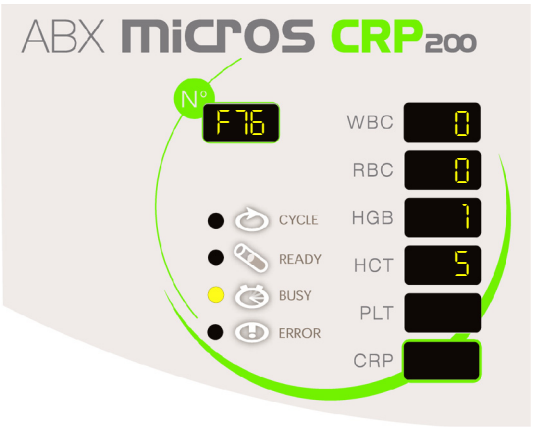


Fig.1: Display

- Run F[77] function: Run burn-in cycle and wait until the instrument stop.

4. Drain and rinse (30 min)

- Remove the 3 reagent straws from the bottle containing the diluted bleach.
- Wrap the straws in absorbant paper.
- Run two Prime cycles: the bleach is drained.
- Replace the diluted bleach by the distilled water bottle and re-plunge the straws in distilled water.
- Run six Prime cycles (Rinse).
- Remove the 3 reagent straws from the distilled water (wrap the straws in absorbant paper).
- Run two Prime cycles: the distilled water is drained.
- Run a Stand by cycle.
- Re-install the reagent bottles and the straws.
- Switch off the instrument.
- Close the instrument cover.

Micros CRP 200

RAS258C

Yearly maintenance

- Concerns
  - Yearly maintenance
- Required tools
  - Hexagonal keys
  - Torx keys
  - Dynamometric screw driver:
  - A302: XEA586AS
  - A301: XEA587AS
  - A300: XEA585AS
  - Cutting pliers
- Required products
  - Liquid soap
  - Distilled water
  - Scalpel
  - Micropipette tip
  - Silicone grease: LAM 004 A
  - Soft paper
  - Grease for mechanical assemblies: XEA381A
  - Grease Oil Vactra: XEA821A
- Intervention time
  - 1h30min
- Frequency
  - Once a year
- Specific kit or consumables
  - Yearly maintenance kit: XEA931AS

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

Yearly Maintenance Kit XEA931AS:

Part number	Designation	Qty
FAA017A	O'RING, TANK MIN/AG+WASTE MIC	1
F0020373000	15x1,5 Nit. 70SH O'ring	1
FAA036A	O'RING, FLOW CELL+LYSE DISP.MIC	2
FAA046A	O'RING, COAXIAL CABLE	2
FAA053A	O'RING, SAMPL.NEEDLE MICROS OT	1
FAA055A	O'RING, MICROS SAMPLING SYRINGE	2
H1008304002	Liquid Syringe Diluent Piston	1
GBG275A	O'RING, APERTURE D=0.5 P60/P80	4

1. Vacuum syringe O'ring replacement

(1x FAA017A)

- Swith off the instrument and disconnect the power supply cable.
- Remove the cover.
- Disconnect on vacuum syringe the fourth tube from the top of the syringe.
- Unscrew the 4 screws (A) maintening the syringe body to the frame (See "Fig.1: Fourth tube, page 2").

Fig.1: Fourth tube

- Manually pull up the piston outside of the vacuum syringe body.
- Unscrew the 4 screws from the top plate of the vacuum syringe (See "Fig.2: Syringe screws, page 3").
- Remove the syringe top plate and the old O'ring.

- Spread a little amount of silicone grease between two fingers and apply a very thin film of grease on the new O'ring.
- Install the new O'ring and the top plate on the vacuum syringe.
- Install back the syringe body on the frame using the 4 screws (A).

Push back the piston inside the syringe body before tightening the 4 O'ring fixation screws CHC M2.5x8. Tighten those 4 screws with a dynamometric screw driver to 400mN.m

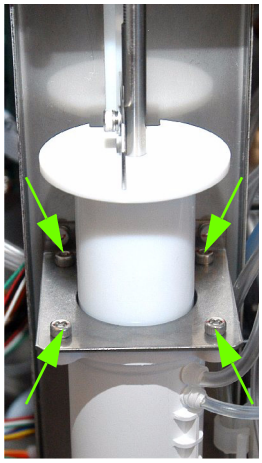


Fig.2: Syringe screws

- Connect back the tube on the vacuum syringe.

2. Rinsing block O'ring replacement

(1x FAA053A)

- Push backward the sampling needle carriage and lift up the sampling needle.
- Remove the clip maintaining the needle in its upper part (See "Fig.3: Clip, page 3").

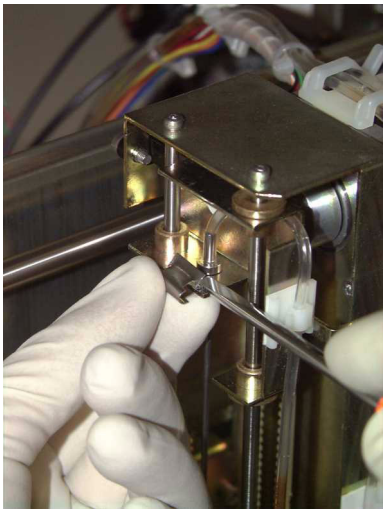


Fig.3: Clip

- Unscrew the 2 screws of the rinsing block (See "Fig.4: Rinsing block screws, page 4").

Fig.4: Rinsing block screws

- Remove the needle from the rinsing block then the O'ring (See "Fig.5: Needle O'ring, page 4").

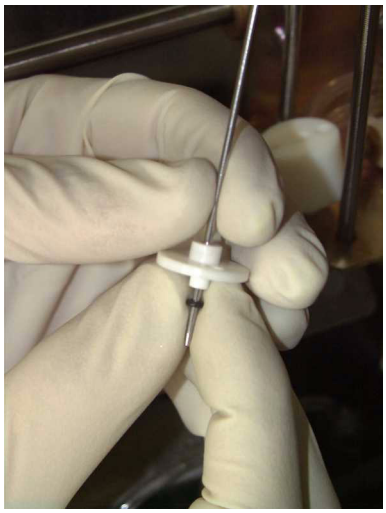


Fig.5: Needle O'ring

- Spread a little amount of silicone grease between two fingers and apply a very thin film of grease on the new O'ring.
- Reinstall the rinsing block in reverse order.
- Use the A301 dynamometric screw driver to tighten the rinsing block screws to 100mN.m.

3. WBC and RBC chambers maintenance

3.1. RBC chamber: Counting head, electrode seals replacement

(1 x GBG275A + 1 x FAA046A)

- Run a drain chamber cycle F[12]
- Remove the chamber cover (See "Fig.6: Chamber cover, page 5").

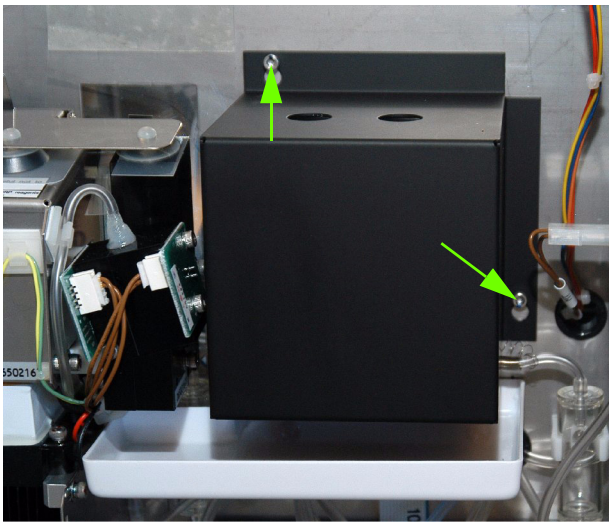


Fig.6: Chamber cover

- Record the tube positions before dismantling the chambers, then unclip the RBC chamber (See "Fig.7: RBC chamber, page 5").

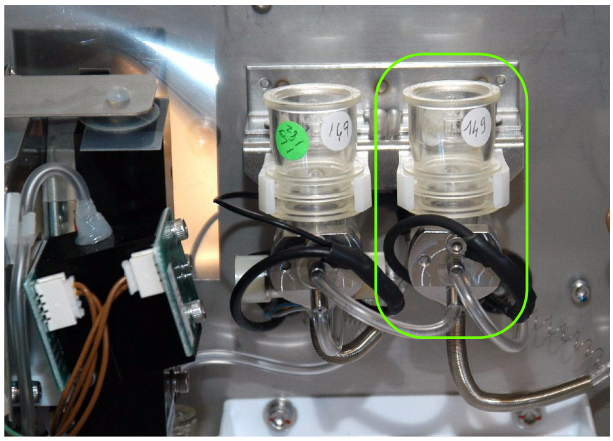


Fig.7: RBC chamber

- Dismantle the electrode (6) loosening the 2 fixation screws (7) and the terminal holding screw (3), See "Fig.8: RBC chamber exploded view, page 6".

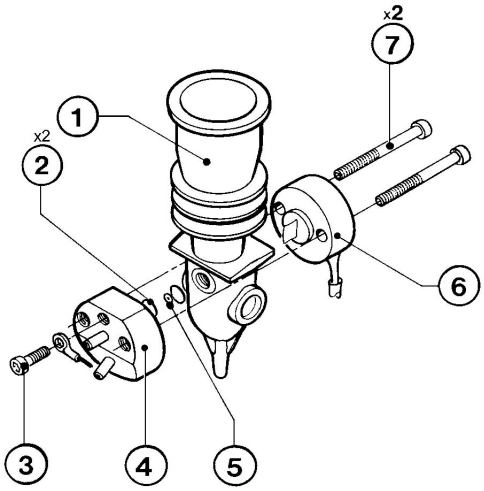
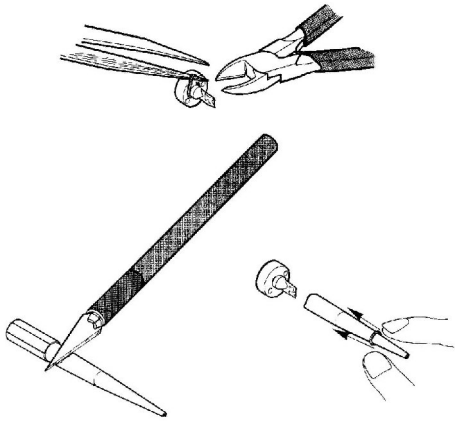


Fig.8: RBC chamber exploded view

- Use a previously cut micropipette tip to replace the electrode O'ring (1x FAA046A) as shown on following diagram.



- Install the chamber over a piece of white paper or cloth.
- Carefully remove the counting head (4) and plunge the aperture (5) in distilled water.

Do not manipulate the aperture using hard instruments. Clean the aperture with a piece of soft paper or preferably, in between 2 fingers.

- Replace the aperture seal (2) (GBG275A).
- Rinse thoroughly with distilled water.
- Dry the exterior of the chamber with a soft paper.

Do not apply too much pressure on the electrode fixation screws, as it can break the aperture (tightening torque = 100mN.m / 14.2 Ozf.in). It is recommended to reconnect the tubes on the counting head before reassembling the "electrode/chamber/counting head" assy in order to avoid applying constraint on the chamber.

- Position the chamber in its fixation clips then reconnect the tubes.

3.2. WBC chamber: Counting head, electrode seals replacement

(1 x GBG275A + 1 x FAA046A)

- Proceed as described for RBC chamber to clean, replace aperture seals and electrode O'ring.

The spectrophotometer can not be dismantled from the chamber. If this one has been dammaged, it is necessary to replace the whole chamber assy.
When cleaning the spectrophotometer, make sure to thorougly rinse it in order to obtain a correct HGB blank measure.

4. CRP Syringe O'ring replacement

CRP syringe is located behind front panel, to access this part you must remove the front panel. See procedure RAS268 Front panel dismantling of this manual.

(1x FAA036A)

- Switch off the instrument and disconnect power supply cable.
- Remove the cover.
- Remove the front panel.
- Clamp and disconnect the CRP syringe tube (See "Fig.9: CRP syringe, page 7").
- Unscrew the 2x CHC M2.5x25 fixation screws and remove CRP syringe.

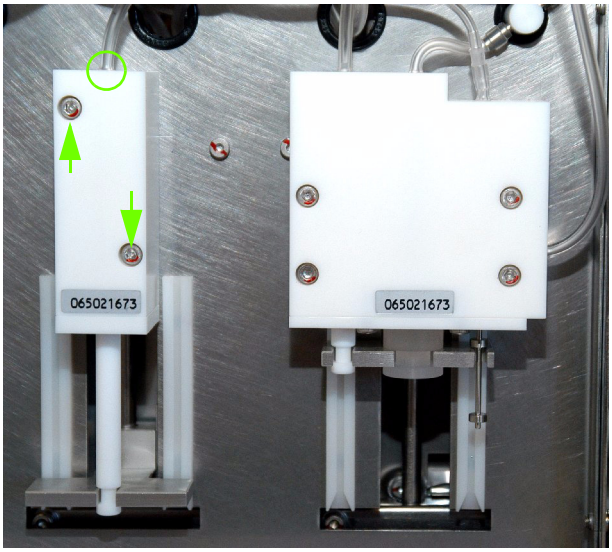


Fig.9: CRP syringe

- Open the syringe (3x Torx screws) and remove O'ring and piston.
- Spread a little amount of silicone grease between two fingers and apply a very thin film of grease on the new O'ring.
- Install new O'ring then pull it on the piston (See "Fig.10: O'ring installation, page 8").

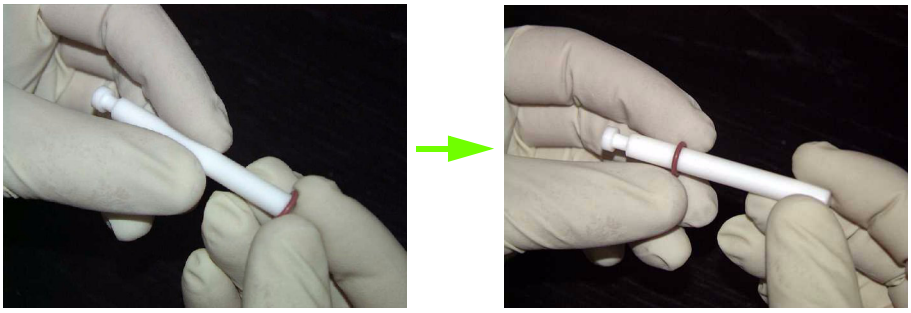


Fig.10: O'ring installation

- Put piston in syringe body (See "Fig.11: Piston installation, page 8").

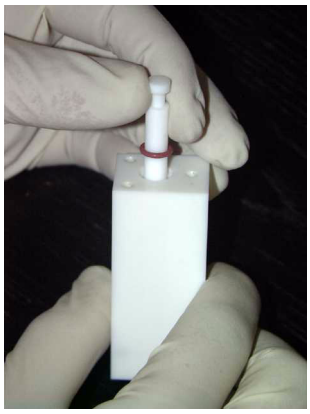


Fig.11: Piston installation

- Place the bottom plate to close syringe and tighten the 3 Torx screws.
- Install back the syringe on the frame and connect CRP syringe tube back.

Continue maintenance before you put back the front panel.

5. Liquid syringe O'rings and Diluent piston replacement

Liquid syringe is located behind front panel, to access this part you must remove the front panel. See procedure RAS 268 Front panel dismantling of this manual.

(1x F0020373000, 1x FAA036A, 2x FAA055A, 1xH1008304002)

- Push the piston assy in the upper position and clamp the diluent and lyse tubing (See "Fig.12: Liquid syringe, page 9").

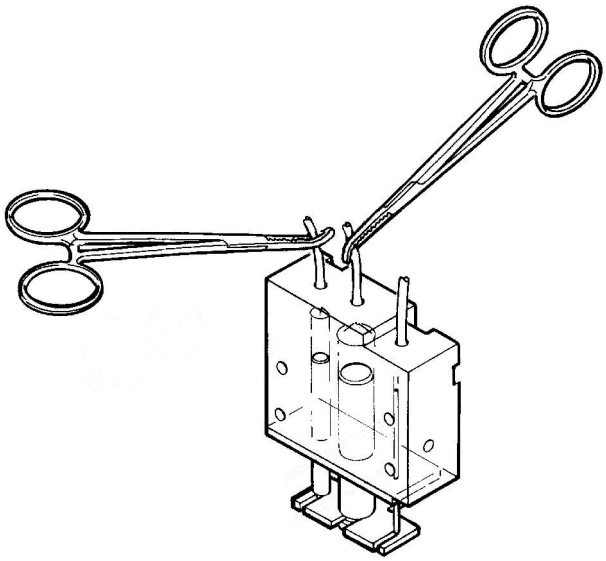


Fig.12: Liquid syringe

- Disconnect diluent, lyse and sampling tubings from the 3 syringes and the tube on the liquid syringe side.
- Unscrew the 4 fixation screws and remove the liquid syringe (See "Fig.13: Liquid syringe screws, page 9").

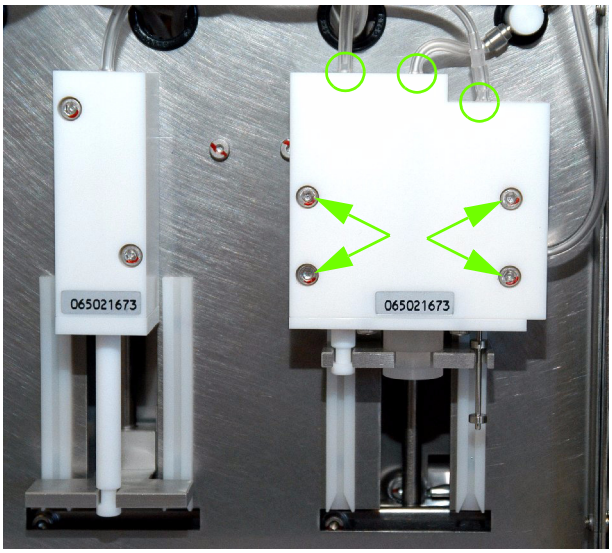


Fig.13: Liquid syringe screws

- Unscrew the 4 CHC screws (A) and the 2 FHC screws (B) in order to remove the syringe bottom plate (See "Fig.14: Bottom plate, page 10").

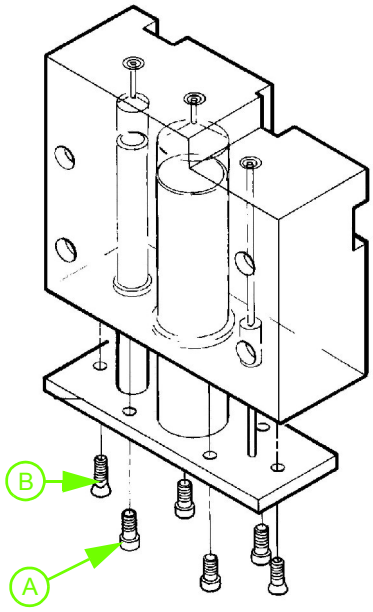


Fig.14: Bottom plate

- Pull out the pistons 1, 2 and 3 from the body with their respective O'ring still around (See "Fig.15: Pistons, page 10").

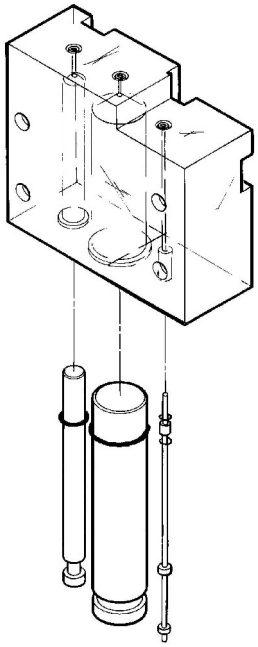


Fig.15: Pistons

- Replace all O'rings by new ones.
- Replace Diluent piston H1008304002 and check other pistons and syringe body cleanliness. If necessary clean with a soft paper.
- Spread a little amount of silicone grease between two fingers and apply a very thin film of grease on each new O'ring.
- Reinstall the liquid syringe in reverse order.
- Use the A302 dynamometric screw driver to tighten the 4 CHC screws (A) to 700mN.m
- Use the A301 dynamometric screw driver to tighten the 2 FHC screws (B) to 400mN.m

6. End of maintenance

6.1. Cleaning

- Remove and clean the CRP protection, then put it back (See "Fig.16: CRP protection, page 11").

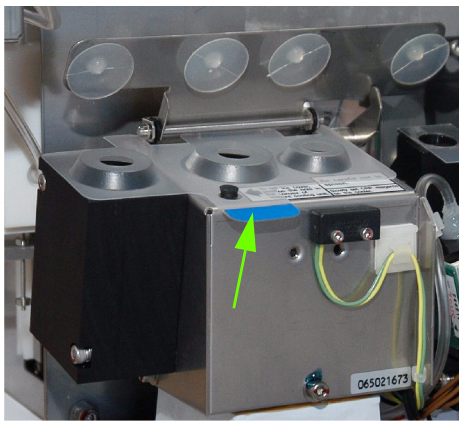


Fig.16: CRP protection

6.2. Lubricating

- Clean the carriage and the needle carriage axes (See "Fig.17: axes, page 11").
- Put one drop of oil on each axes.

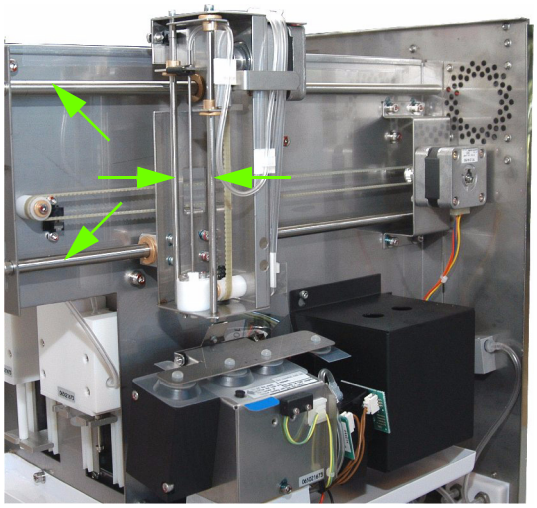


Fig.17: axes

- Disconnect the diluent and waste inputs located at the rear of the instrument.
- Move the vacuum syringe by hand in order to have an access to the motor gearings.
- Spread a little amount of grease on the gearings and on coggs of the piston axis (See "Fig.18: Vaccum syringe lubricating, page 12").

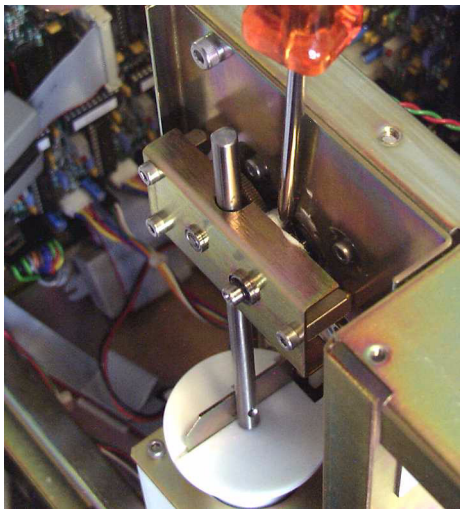


Fig.18: Vaccum syringe lubricating

- Manually move the syringe assembly to spread the grease on all parts of the gearings and piston axis (See "Fig.19: Manual moving, page 12").

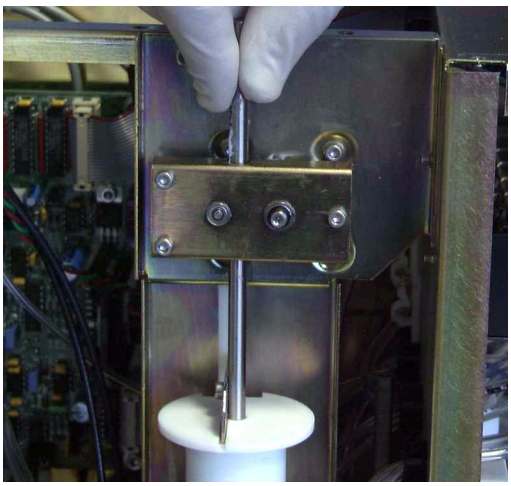


Fig.19: Manual moving

- Spread a little amount of grease on the coggs of the piston axis of CRP syringe and liquid syringe (See "Fig.20: CRP & reagent syringes lubricating, page 12").

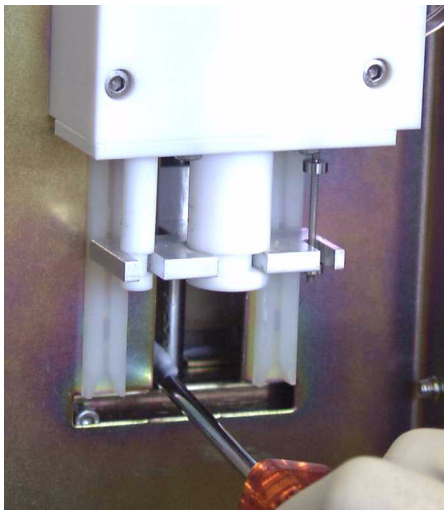


Fig.20: CRP & reagent syringes lubricating

- Finish the front panel mounting.

7. Check

- Check for reagents and diluent quantities remaining.
- Check that cables (flat cables, connectors,...) and tubings are all connected.
- Connect power supply cable.
- Switch on printer and instrument.
- Run 2 Prime cycles.
- Close sampling door to start a blank cycle.
- During this cycle check for:
  - Watertightness of Waste, CRP and Liquid syringe.
  - Watertightness of rinsing block.
  - Unusual mechanic noises
  - Chambers draining.
  - Good opening of CRP block flap.
- Then proceed to the Checkup after intervention (Procedure RAS 259).

It is mandatory to proceed to Checkup after intervention procedure after maintenance. This procedure will make sure you get the best instrument reliability! See procedure RAS 259 in this manual.

Micros CRP 200

RAS259C

Check up after intervention

- Concerns
  - Checkup after intervention
- Required tools
  - None
- Required products
  - Fresh and normal blood samples
  - Calibration blood samples
  - CRP Calibration serum
- Intervention time
  - 1h
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

This procedure must be performed on a clean instrument If instrument is suspected to be not perfectly clean, perform a CLEAN cycle.

1. Preliminary

- Run a STARTUP cycle

2. Repeatability

- Based on 10 consecutive analyses on CBC and 5 consecutive analyses on CRP without alarm from one fresh and normal blood sample.
- Run 10 consecutive analyses on CBC and 5 consecutive analyses on CRP.
- Control to have variation coefficients within the following acceptable limits:

Parameters	CV	Measurement range	
		From	To
WBC	< 2.5%	4.75	12.50 x 10^3/mm^3
RBC	< 2%	4.00	5.00 x 10^6/mm^6
HGB	< 1.7%	12.0	16.6 g/dL
HCT	< 2%	37.0	50.0 %
PLT	< 5%	150	355 x 10^3/mm^3
MCV	< 1%	83	100 fL
RDW	< 3%	12	15 %
MPV	< 3%	7	9 fL
LYM #	< 5%	18.5	47.0 %
MON #	< 10%	2.5	6.0 %
GRA #	< 3%	49	78 %
CRP	< 10%	< 0.5 mg/dL	
CRP	< 4%	< 5 mg/dL	

$\overline{X}$: Mean
Xi: Measure value
n: Measure number
SD: Standard deviation

$$\overline{X} = \frac{\sum Xi}{n} \qquad SD = \sqrt{\frac{\sum (\overline{X} - Xi)^2}{n-1}}$$

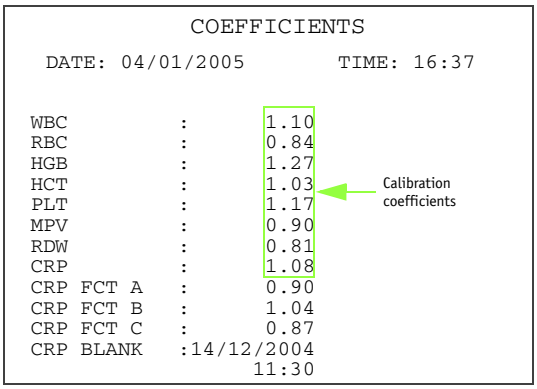
CV is calculated by means of the below formula:

$$CV(\%) = \frac{SD}{\overline{X}} x100$$

3. CBC Calibration

Calibration has to be done always on a clean and reproducible instrument, blank values must be in the acceptable limits

- The calibration can be achieved on one parameter or more at the same time.
- Turn on the printer and switch on the instrument.
- Press Mode key to select CBC mode.
- Prepare the calibrator according to the specific instructions (temperature, mixing,etc...).
- Measure the calibration blood six times.
- After eliminating the maximum and minimum values, acquire the mean value of the remaining four data, for each of the six measurement item results (WBC, RBC, HGB, HCT,PLT, MPV).
- Calculate the ratio: Assay value/Mean value of four data for each parameter
- Press Calibration key on the operation panel then press Reprint key: Currently stored calibration coefficients are printed out:



- Multiply each printed calibration coefficient by each ratio previously calculated to obtain the new calibration coefficient.
  *New calibration coefficient = displayed calibration coefficient x ratio
- New calibration coefficient for each item should be in the following range

Parameters	Calibration range	
	From	To
WBC	1.00	1.21
RBC	0.77	1.00
HGB	0.90	1.15
HCT	0.90	1.20
PLT	0.98	1.50
MPV	1.09	1.31
CRP	0.88	1.09

If the above range is exceeded, the instrument may be malfunctioning. Stop the calibration, press Clean key and perform measurement again

- Using the up and down keys, set the new WBC calibration coefficient obtained in previous step .
- Press Enter key.
- The RBC calibration coefficient is displayed in RBC display.
- Similarly, enter the new RBC calibration coefficient and press Enter key.
- Perform as described previously for HGB, HCT, PLT and MPV (See "Fig.1: Coefficients, page 4"):

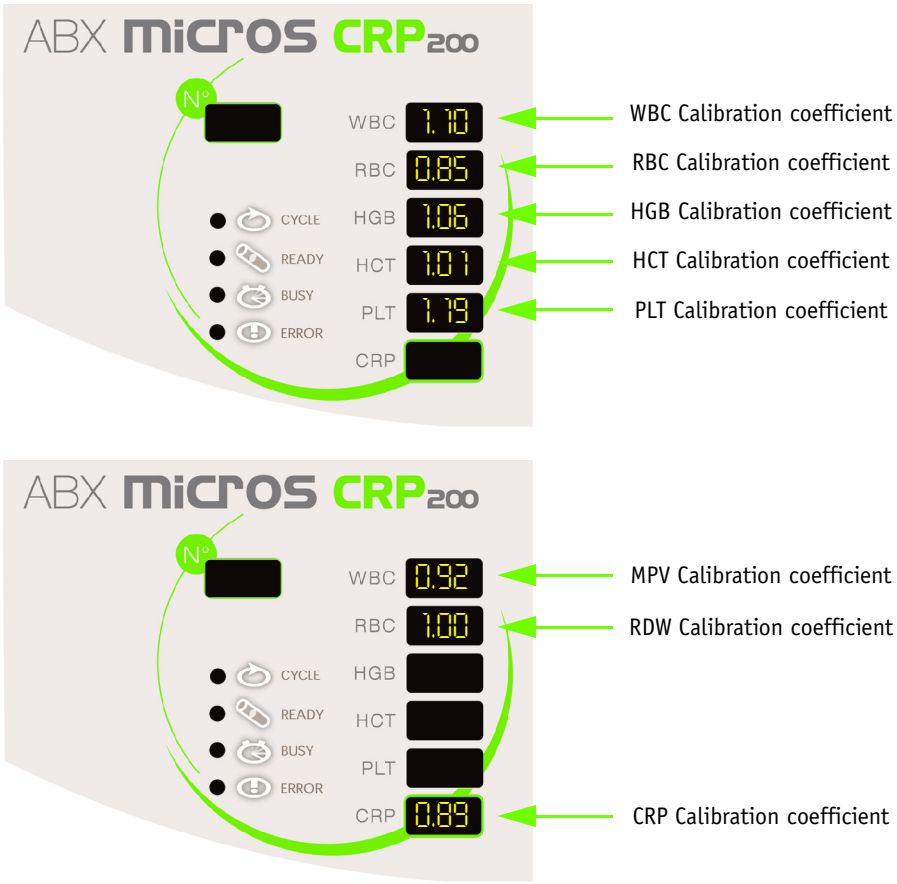


Fig.1: Coefficients

After the coefficient MPV, the RDW coefficient is displayed. Do not change RDW coefficient, it is factory adjusted.
In case of 18p the PDW coefficient is displayed. Do not change PDW coefficient, it is factory adjusted.

- Press Enter key until you exit function.
- The ready LED lights up to indicate that the instrument is ready for measurement.
- Measure the control blood to confirm that the assay values are within the allowable range.

4. CRP Calibration

Before starting CRP calibration, make sure that the 3 CRP reagent sensitivity factors correspond to the reagents. To change those factors, please refer to "4.3.Input of the CRP reagent sensitivity factors, page 6".

4.1. Calibrating the CRP mode.

- Make sure the printer is ON.
- Select the CBC + CRP mode using the Mode key.
- Obtain the ABX CRP Std serum and let it equilibrate to room temperature.
- Rotate the tube holder so that the calibrator vial will be in the 12:00 o'clock when it is placed into tube holder for sampling.
- Verify that there are sufficient quantities of CRP reagents before running calibration.

Caution: You must remove the caps from all samples before placing them into the tube holder. Failure to remove the caps will cause severe damage to the sample needle assembly.

- Remove the cap from the vial, place the calibrator into the tube holder and close the tube holder door.
- The analysis cycle will take approximately 4 minutes 30 seconds. Results will print at the end of the cycle.
- Repeat previous steps for 5 to 7 cycles.
- When all CRP calibration analyses are complete, obtain all the printed results and calculate the Mean (X), Standard Deviation (SD) and Coefficient of Variation (CV%) for the following parameter:

Parameters	C.V.%
CRP	≤ 5.0%

- The calibration is acceptable if and only if it comes within the «Calibration Passed» criteria.

4.2. Calibration Passed Criteria

- The calibrated parameter must be within it's CV% limits.
- The calculated Mean value of the parameter must be within 20% of the target value indicated on the calibration assay sheet.

Note: If calibration does not fall within these criteria, then calibration has «Failed».

- Press the Calibration key located on the top key pad.
- Now press the Reprint key. The old calibration coefficients will be now be printed out.
- The WBC coefficient will be flashing in the WBC parameter window. Press the Enter key several times to scroll down to PLT.
- Continue to press the Enter key to scroll past the second WBC and RBC values until the CRP window flashes a value.
- Calculate the new calibration coefficient for CRP using the following formula.

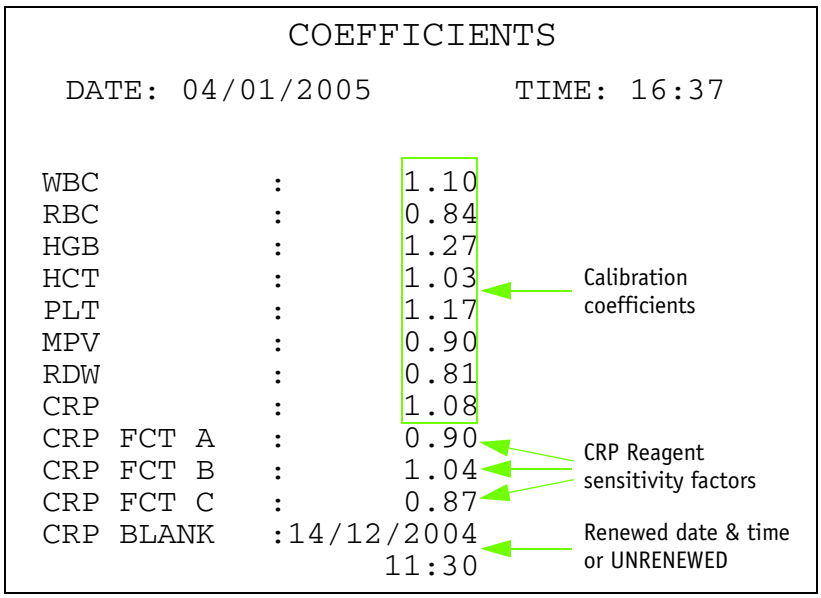
$$\text{New calibration coefficient} = \frac{\text{Target Value (from assay sheet)}}{\text{Mean parameter value (from calculations)}} \times \text{Old cal. coefficient}$$

- Adjust the CRP coefficient by using the Up or Down arrow keys, then press the Enter key several times to accept the change and exit the calibration menu.
- Verify that your new calibration coefficient is within the ranges listed before.
- Now run the calibrator 3 times and verify that the average of all three results are within the limits that are noted on the assay sheet.

4.3. Input of the CRP reagent sensitivity factors

The CRP reagent sensitivity factors are described on the underside of the colored box lid of ABX CRP REA.
In order to perform lot correction of the reagent, be sure to enter those factor values in the instrument every time the lot changes.

- Select the CBC + CRP mode.
- Push «PUSH» on the top front of the main body to open the upper door.
- Press the Calibration key.
  The WBC result display starts blinking. The WBC calibration coefficient currently stored is displayed. Press the Reprint key to print out the CRP reagent sensitivity factor (CRP factor) currently stored.



In the USA, PCT and PDW parameters are for research use only and not for use in diagnostic procedures.

- When the Mode key is pressed in the state that the WBC display is blinking, CRP reagent sensitivity factor A, B and C currently stored are displayed on the HCT, PLT and CRP displays.
- Press the Enter key. Only the HCT display will start blinking. The instrument is now ready to enter the CRP reagent sensitivity factor A.
- Using the Up or Down arrow keys, enter the CRP reagent sensitivity factor A marked on the ABX CRP REA package.
- Press the Enter key again. Only the PLT display will start blinking. The instrument is now ready to enter the CRP reagent sensitivity factor B. Using the Up or Down arrow keys, enter the CRP reagent sensitivity factor B.

- Press the Enter key again. Only the CRP display will start blinking. The instrument is now ready to enter the CRP reagent sensitivity factor C. Using the Up or Down arrow keys, enter the CRP reagent sensitivity factor C.

The entry of the CRP reagent sensitivity factors can be canceled if the Start/Pause key is pressed before the Enter key. In this case, the CRP reagent correction values remain unchanged. Start this procedure over again from the beginning.

- Check that the new ABX CRP REA kit is placed in the reagent cooling unit.
- Close the sampling holder without placing any sample in the tube holder.
  Calibration is performed.
  When calibration is completed, the instrument becomes ready for measurement. The entered CRP reagent sensitivity factors are simultaneously printed out.
- Check that the printed results agree with the CRP reagent sensitivity factors of CRP.

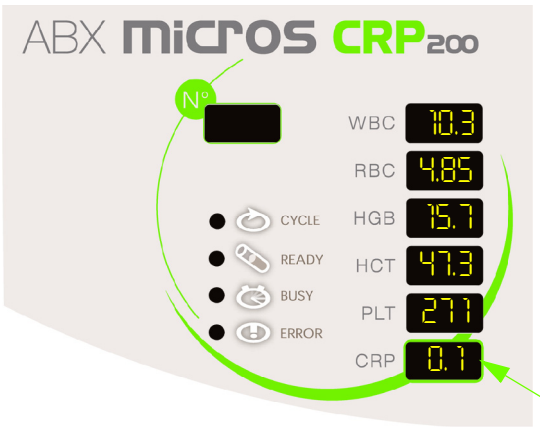
Calibration is required each time the reagent lot changes.

- Run the ABX CRP TROL Low, Medium and High controls and verify that they are within their assay limits noted on their packages.

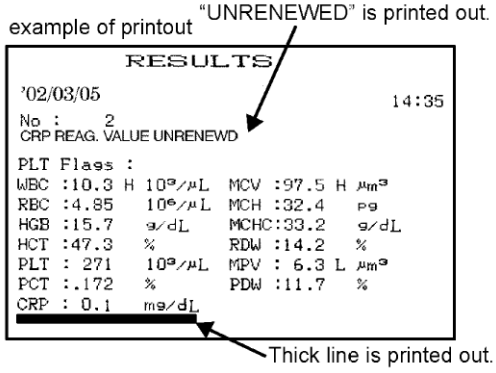
When the CRP display blinks:

- If the Start/Pause key is pressed by mistake during the entering of the sensitivity factors, the CRP display blinks and the instrument becomes ready for measurement.
- If the ABX CRP REA kit is not placed or deteriorated, the CRP display blinks in the Ready state after completion of calibration.
- The measurement can be performed, however, the reliability of the measurement value will be lost due to the lack of calibration.
- A thick line below the result and «CRP REAG. VALUE UNRENEWED» will be printed in the printed CRP results (see below).

Exemple of display



example of printout



- Carry out the calibration.
- Run [F37] function to print the configuration and check the blank CRP value. It must be less than 0.2.

Micros CRP 200

RAS260C

Step by step analysis cycle

- Concerns
  - Analysis cycle
- Required tools
  - None
- Required products
  - None
- Intervention time
  - None
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Step by step analysis cycle introduction

1.1. Introduction

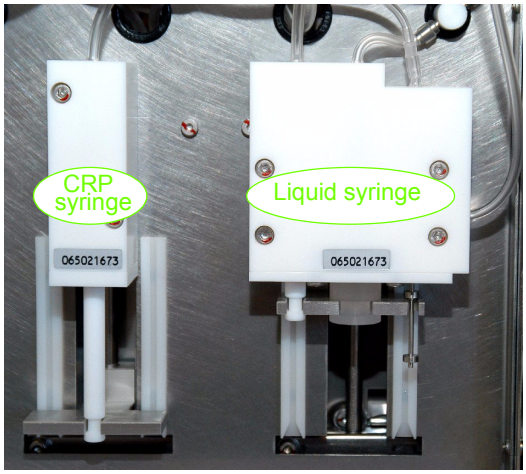
◆ The main cycle consists of six principal phases:

1- CRP Preparation #1
2- Preparation Of CBC Dilutions And Counting
3- CRP Preparation #2
4- During CRP Preparation #2 Incubation
5- CRP Measurement
6- CRP After Cycle

◆ All phases are described in this procedure

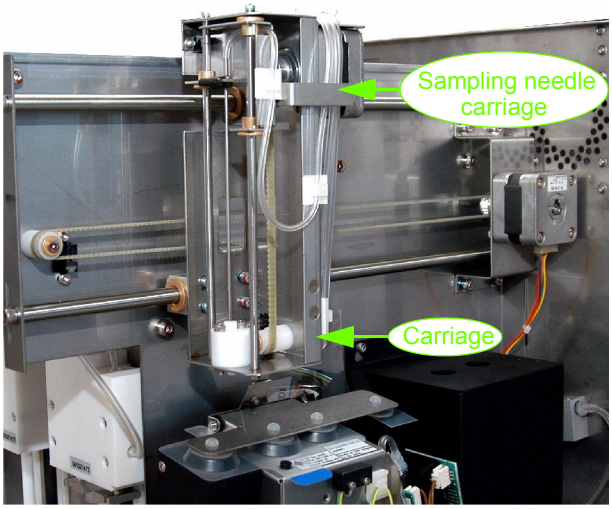
1.2. Mechanical components

◆ CRP Syringe and liquid syringe:

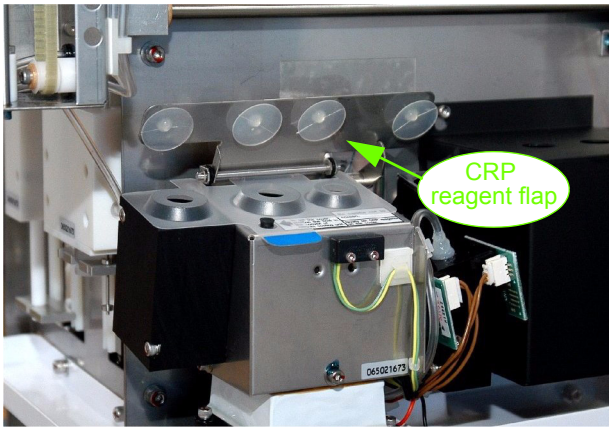


◆ Vacuum syringe:

◆ Carriage and sampling needle carriage:



◆ CRP reagent flap:



2. Step by step analysis cycle check:

2.1. CRP Preparation #1 (30s)

◆ Carriage to CRP-R1 (Saponin) and draining of needle rinsing block:
- CRP reagent flap is opened.
- Valve 8.
- Vacuum syringe goes up.
- CRP syringe goes down.
- Carriage goes right.

◆ Creation of a 4µl air bubble in the needle, while CRP chamber is drained:
- Liquid syringe goes down.
- Valve 18.
- Vacuum syringe goes up.

◆ 100µl of CRP-R1 reagent (saponin) sampling:
- Valve 2.
- Vacuum syringe initialization.
- Sampling needle carriage goes down.
- Valve 15.
- CRP syringe goes down.

- Needle up & cleaning, carriage goes to sampling tube:
  - Valve 14.
  - CRP syringe goes up.
  - Vacuum syringe goes up.
  - Valve 11.
  - Valve 8.
  - Liquid syringe goes up.
  - CRP reagent flap is closed.
  - Sampling needle carriage goes down.

- Creation of a 4 µl air bubble in the needle, while CRP chamber is drained:
  - Liquid syringe goes down.
  - Valve 18.
  - Vacuum syringe goes up.

- 8µl blood sampling for CRP count:
  - Valve 2.
  - Vacuum syringe initialization.
  - Sampling needle carriage goes down.
  - Liquid syringe goes down.
  - Vacuum syringe goes down.

- Movement over WBC chamber and needle exterior cleaning:
  - Vacuum syringe goes up.
  - Sampling needle carriage initialization.
  - Valve 11.
  - Valve 8.
  - Liquid syringe goes up.
  - Carriage initialization.
  - Carriage goes right.
  - Sampling needle carriage goes down.
  - Liquid syringe goes down.
  - Valve 5.
  - Valve 2.
  - Vacuum syringe initialization.
  - Valve 11.
  - Liquid syringe goes up.

- Needle up, movement over CRP chamber, rinsing block cleaning and CRP chamber drain:
  - Sampling needle carriage initialization.
  - Valve 8.
  - Vacuum syringe goes up.
  - Carriage goes left.
  - CRP reagent flap is opened.
  - Valve 14.
  - CRP syringe goes down.
  - Valve 18.

- Needle down into CRP chamber to distribute blood sample (8µl) and CRP-R1 (100µl), bubbling:
  - Valve 2.
  - Vacuum syringe initialization.
  - Sampling needle carriage goes down.
  - Valve 15.
  - CRP syringe goes up.
  - Valve 14.
  - CRP syringe goes up.
  - CRP syringe goes down.
  - CRP syringe goes up.

- Movement over WBC chamber and needle exterior and interior cleaning:
  - Sampling needle carriage initialization.
  - CRP reagent flap is closed.
  - Carriage goes right.

- CRP syringe goes down.
- Sampling needle carriage goes down.
- Valve 11
- Liquid syringe goes up.
- Valve 10.
- CRP syringe goes up.

◆ WBC chamber and wastes draining:
- Valve 12.
- Vacuum syringe goes up.
- Liquid syringe goes down.
- Vacuum syringe initialization.
- Valve 5.
- Valve 11.
- Liquid syringe goes up.

2.2. Preparation of CBC dilutions and counting

◆ Needle up and rinsing block cleaning, carriage goes to sampling tube:
- Sampling needle carriage initialization.
- Liquid syringe initialization.
- Valve 8.
- Vacuum syringe goes up.
- Sampling needle carriage goes down.
- Carriage initialization.
- Liquid syringe goes down.
- Valve 5.
- Vacuum syringe initialization.
- Valve 2

◆ 10µl blood sampling for CBC count:
- Needle carriage goes down.
- Liquid syringe goes down.

◆ Needle initialization and cleaning:
- Vacuum syringe goes up.
- Valve 11.
- Valve 8.
- Liquid syringe goes up.
- Carriage initialization.
- Sampling carriage goes up.
- Sampling door is opened.
- Carriage goes right.

◆ Hgb blank measurement and counting heads cleaning:
- Hbg blank calculation.
- Valve 11.
- Valve 2.
- Valve 7.
- Valve 6.
- Liquid syringe goes up (diluent for 1.2ml).

◆ WBC chamber and vacuum syringe draining, movement of lyse back in the tubing (near the mixing «T»):
- Valve 12.
- Vacuum syringe goes up.
- Draining.
- Valve 5.
- Vacuum syringe initialization.
- Valve 1.
- Sampling needle carriage goes down.
- Liquid syringe goes down.

◆ Air drawing inside the needle and down into WBC chamber:
- Liquid syringe goes down.
- Sampling needle carriage goes down.
- Valve 11.
- Liquid syringe goes up (diluent for 1.54ml),
- Draining.
- Valve 2.

◆ WBC chamber draining and loaded with diluent, RBC & WBC chamber draining, rinsing block cleaning:
- Valve 12.
- Vacuum syringe goes up.
- Liquid syringe goes down.
- Draining.
- Valve 2.
- Valve 11.
- Liquid syringe goes up.
- Valve 5.
- Vacuum syringe initialization.
- Draining.
- Valve 13.
- Vacuum syringe goes up.
- Draining.
- Valve 12.
- Vacuum syringe goes up.
- Draining.
- Valve 8.
- Sampling needle carriage goes down.

◆ First dilution and bubbling:
- Valve 2.
- Valve 11.
- Vacuum syringe goes down.
- Liquid syringe goes up (0.5ml outside needle).
- Valve 10.
- Liquid syringe goes up (1.2ml of blood and diluent inside needle).
- Valve 12.
- Vacuum syringe goes down and up.
- Vacuum syringe goes down and up.

◆ Needle and liquid syringe initialization, rinsing block cleaning:
- Sampling needle initialization.
- Valve 2.
- Liquid syringe initialization.
- Valve 8.
- Vacuum syringe goes up.
- Valve 2.
- Vacuum syringe initialization.
- Liquid syringe goes down.

◆ First dilution sampling for second dilution:
- Sampling needle carriage goes down.
- Liquid syringe goes down (28.5µl sampling of first dilution in WBC chamber).
- Sampling needle carriage goes up.

◆ Air drawing inside needle, needle cleaning and initialization, transfer from WBC chamber to RBC chamber:
- Liquid syringe goes down.
- Liquid syringe goes up.
- Vacuum syringe goes up.
- Valve 11.
-Liquid syringe goes up.
- Sampling needle carriage initialization.
- Valve 8.
- Valve 2.
- Carriage right (over RBC chamber).

- Second dilution in RBC chamber and lyse of first dilution in WBC chamber:
  - Sampling needle carriage goes down in RBC chamber.
  - Vacuum syringe goes down.
  - Valve 12.
  - Control of the temperature.
  - Valve 2.
  - Vacuum syringe goes down.
  - Valve 1.
  - Liquid syringe goes up (inject 0.5ml of lyse in WBC chamber).
  - Valve 11.
  - Liquid syringe goes up (0.5ml of diluent outside needle).
  - Vacuum syringe goes down.
  - Valve 10.

- Bubbling of dilution in WBC chamber:
  - Valve 12.
  - Vacuum syringe goes down.

- Bubbling of dilution in RBC chamber:
  - Valve 13.
  - Vacuum syringe goes down.
  - Liquid syringe goes down.
  - Sampling needle initialization.

- Vacuum syringe draining:
  - Valve 5.
  - Vacuum syringe initialization.
  - Valve 2.

- Liquid syringe loading:
  - Liquid syringe down.
  - Carriage goes left.
  - Vacuum syringe up.

- Vacuum for the first counting (about 200mb):
  - Vacuum syringe goes up.
  - Valve 6.

- Counting heads cleaning with diluent:
  - Valve 7.
  - Valve 11.
  - Liquid syringe goes up.

- Counting...

2.3. CRP Preparation #2

- Needle draining and movement over CRP-R2 reagent bottle:
  - CRP reagent flap is opened.
  - Valve 8.
  - Vacuum syringe goes up.
  - Sampling needle carriage goes left over CRP-R2 reagent bottle.

- Creation of an air bubble into needle:
  - Valve 2.
  - Vacuum syringe initialization.

- 100 µl CRP-R2 reagent (CRP buffer) sampling:
  - Sampling needle carriage goes down.
  - Valve 15.
  - CRP syringe goes down (100µl of CRP-R2 sampling).

- Needle up and cleaning, carriage moves over CRP chamber:
  - Vacuum syringe goes up.
  - Sampling needle carriage goes up.
  - Valve 8.
  - Carriage right (over CRP chamber).

- CRP-R2 reagent mixing in CRP chamber:
  - Valve 2.
  - Vacuum syringe initialization.
  - Sampling needle carriage goes down into CRP chamber.
  - Valve 15.
  - CRP syringe goes up (inject CRP-R2 reagent in CRP chamber).
  - Valve 14.
  - CRP syringe goes up.
  - CRP syringe goes down.
  - CRP syringe goes up.
  - Sampling syringe goes up.
  - CRP reagent flap is closed.

It takes 20 seconds to complete the reaction between buffer and CRPproteins.

2.4. During CRP Preparation #2 Incubation

- Needle moves over WBC chamber, WBC chamber is drained:
  - Carriage goes right.
  - Valve 12.
  - Vacuum syringe goes up.

- Curves are printed out

- RBC chamber is drained:
  - Valve 11.
  - Valve 13.
  - Vacuum syringe goes up.

- Rinsing of WBC chamber with diluent:
  - Liquid syringe goes up (inject 2.6ml of diluent into WBC chamber).
  - Draining.

- Needle moves to RBC chamber:
  - Valve 2.
  - Carriage right (over RBC chamber).
  - Sampling needle carriage goes down.

- Vacuum syringe draining and rinsing of RBC chamber with diluent:
  - Valve 5.
  - Vacuum syringe initialization.
  - Valve 11.
  - Liquid syringe goes up (inject 2.6ml of diluent into RBC chamber).

- Initializations and needle rinsing block draining:
  - Liquid syringe initialization.
  - Sampling needle carriage initialization.
  - Vacuum syringe goes up.
  - Valve 6.
  - Valve 4.
  - Liquid syringe goes down.
  - Valve 8.
  - Carriage goes left.

- Graphic printout

2.5. CRP Measurement

- Creation of a 4µl air bubble in the needle and sampling of 200µl of CRP-R3 reagent (latex):
  - CRP reagent flap is opened.
  - Liquid syringe goes down (aspirate 4µl of air in the needle).
  - Sampling carriage goes down into CRP-R3 reagent bottle.
  - Valve 15.
  - CRP syringe goes down (100µl of CRP-R3 sampling).

- Needle goes up and moves to CRP chamber:
  - Vacuum syringe goes up.
  - Valve 11.
  - Valve 8.
  - Liquid syringe goes up.
  - Sampling needle carriage goes up.
  - Carriage goes right over CRP chamber.

- Needle goes down into CRP chamber and vacuum syringe is initialized:
  - Sampling needle carriage goes down (into CRP chamber).
  - Valve 5.
  - Vacuum syringe initialization.
  - Valve 2.

- Distribution of CRP-R3 sample into CRP chamber and CRP chamber dilution mixing:
  - Valve 15.
  - CRP syringe goes up (inject CRP-R3 reagent into CRP chamber).
  - Sampling needle carriage goes up.
  - Valve 14.
  - CRP syringe goes up & down several times (mixing).

It takes 20 seconds to complete the reaction between latex and CRP proteins.

- CRP measurement starts for 80 measures (one per second)

2.6. CRP After Cycle

- CRP chamber draining and cleaning with diluent from inside and outside needle:
  - Valve 18
  - Vacuum syringe goes up
  - Sampling needle carriage goes down (into CRP chamber)
  - Valve 14
  - CRP syringe initialization
  - Valve 11
  - Liquid syringe goes up
  - Valve 10
  - Liquid syringe goes up
  - Valve 18
  - Vacuum syringe goes up

- Previous step is repeated one time

- Needle out from CRP chamber:
  - Vacuum syringe goes up
  - Valve 8
  - Sampling needle carriage initialization
  - Carriage initialization

- CRP blank is performed

- CRP result is printout

Micros CRP 200

RAS261C

Needle & carriage adjustment

- Concerns
  - Needle & carriage position adjustment
- Required tools
  - Hexagonal keys
  - Flat screw driver
  - Centering tool GBF055A
- Required products
  - None
- Intervention time
  - 30 min
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Carriage sampling location adjustment

- Remove the ABX Micros CRP cover then switch the instrument on.

It is mandatory to remove all CRP specific reagents because of risks of vial polution by needle. Put reagents in a fridge for their conservation.

- Enter F[5c] function, press ENTER.
- Locate tube holder's smallest hole in sampling position (A) and close sampling door (See "Fig.1: needle location, page 2").
- Manually move down needle (B).
- Move the carrier to adjust the front/rear position of the needle in the hole (C) then press Enter.

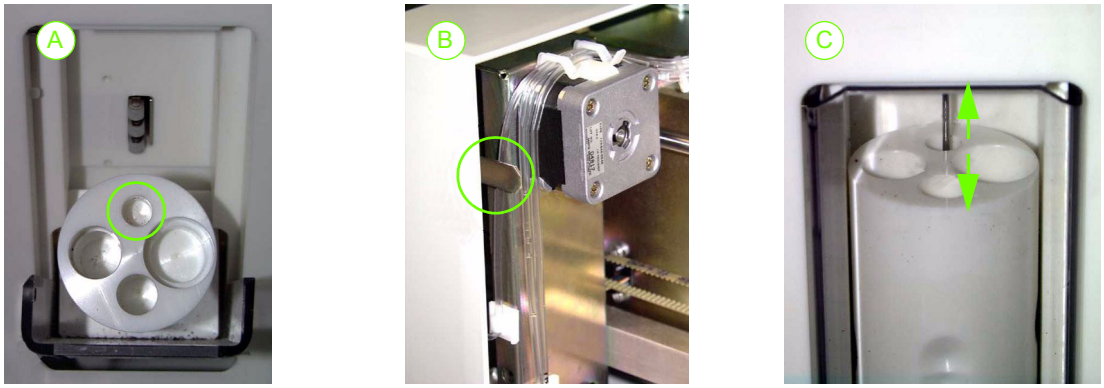


Fig.1: needle location

- If the position is not correct, enter F[5d] function.
- Press Enter and re-adjust number of step:
  Needle is too much forward:
  - Decrease «Sampling» value, displayed on WBC display, using Up and Down key (one step for 0.1 mm).
  Needle is too much backward:
  - Increase «Sampling» value, displayed on WBC display, using Up and Down key (one step for 0.1 mm).

If WBC display shows «000», re-adjust the carriage home sensor position (See "Fig.2: carriage home sensor, page 2")

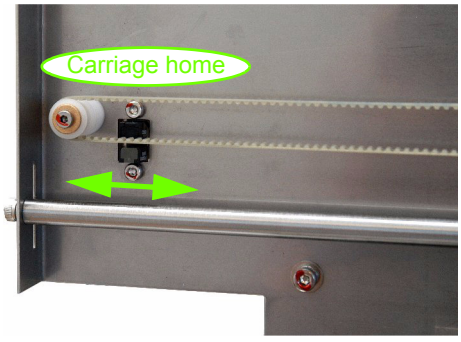


Fig.2: carriage home sensor

This value is «Sampling» value on the configuration ticket.

2. Needle home adjustment

- Enter F[61] function, press Enter.
- Locate a plane part under the rinsing block (See "Fig.3: Needle home, page 3") and manually move down the needle until contact with the plane part.

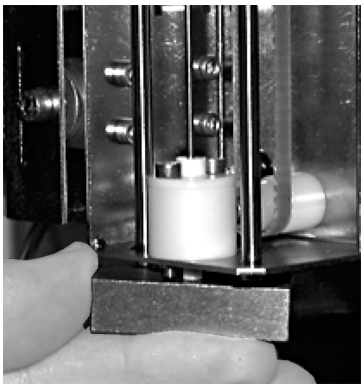


Fig.3: Needle home

- The correct position of the needle home detection sensor is when WBC display is empty and the value in RBC display is between 65 and 75.
- If the value is out of those limits, a «-» will be displayed in WBC window.. In this case, the needle home detection sensor position must be adjusted (See "Fig.4: Needle home cell, page 3"):

  - if the «-» is in the upper part of the WBC window, move the needle home sensor up.
  - If the «-» is in the lower part of the WBC window, move the needle home sensor down.

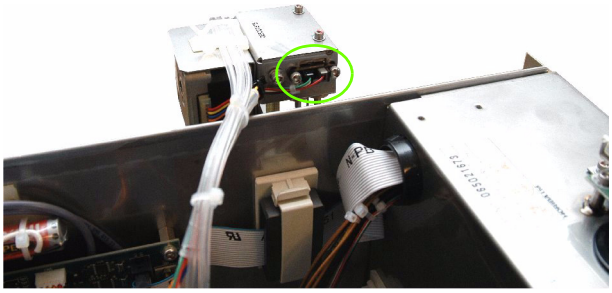


Fig.4: Needle home cell

3. Needle heigth adjustment

- Remove chamber cover (See "Fig.5: Cover screws, page 4").

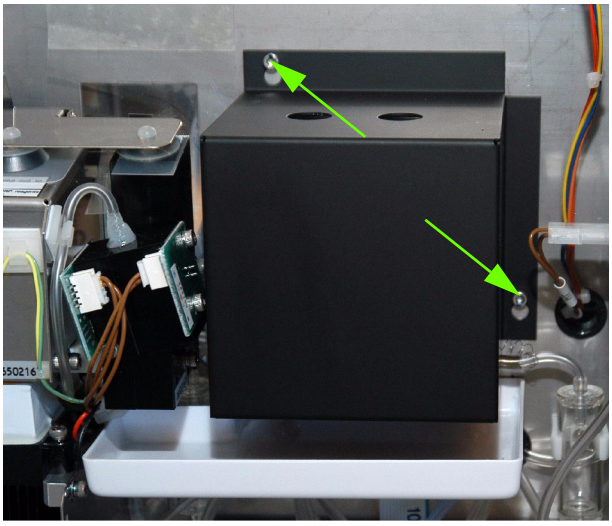


Fig.5: Cover screws

- Enter F[51] function, press Enter.
- The carriage moves over WBC chamber. Manually move the needle down until it touch the edge of the WBC chamber (See "Fig.6: Needle on WBC chamber, page 4").

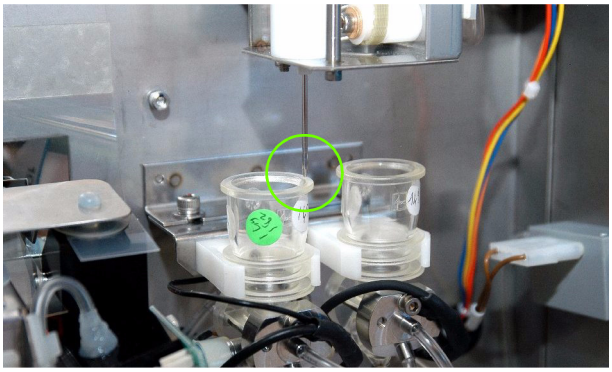


Fig.6: Needle on WBC chamber

- Press ENTER: Needle moves up and carriage returns to init position, number of steps is returned into WBC diplay, check value is between 612 and 639.

4. Carriage location over WBC/RBC chamber adjustment

4.1. Adjustment

- Locate centering tool (GBF055A) over the RBC and WBC chambers (See "Fig.1: needle location, page 2").

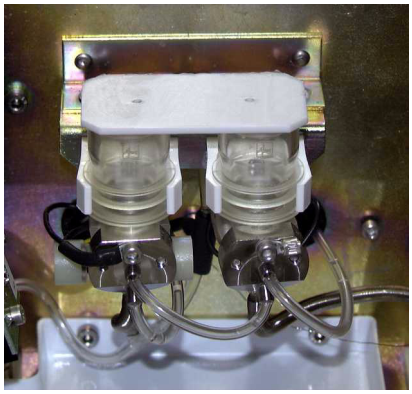


Fig.7: Centring tool

- Enter F[54] function, press ENTER.
- Carriage is moved over WBC chamber.
- Manually pull down needle inside WBC chamber.
- Hit a key to continue, needle moves up and carriage returns to home position.
- Adjustment value is displayed between Tube number and WBC displays.
- Write down this value and press ENTER to exit function.

This value is «Carriage» value in configuration ticket.

4.2. Adjustment Check

- Enter F[53] function, press ENTER.
- Carriage is moved over WBC chamber and needle is coming down into it.
- Check that the needle is in centering tool and press ENTER.
- Carriage is moved over RBC chamber and needle is coming down into it.
- Check that the needle is in centering tool and press ENTER.
- If needle is not well centered, enter F[55] function and press ENTER:

  - Needle is too much backward: decrease «CARRIAGE» value by the meaning of Up and Down keys (1 step for 0.1mm).
  - Needle is too much forward: increase «CARRIAGE» value by the meaning of Up and Down keys (1 step for 0.1mm).

- Repeat F[53] function until you get a correct adjustment.

5. Needle and carriage location over CRP chamber adjustment

Make sure that there is no CRP reagent vial in CRP assy.

- Enter F[56] function and press Enter: the carriage is moved over CRP glass chamber.
- Manually move on the right hand side the carriage and move down the needle until it touch the edge on the right hand side of glass chamber (See "Fig.8: Needle on glass chamber, page 6").

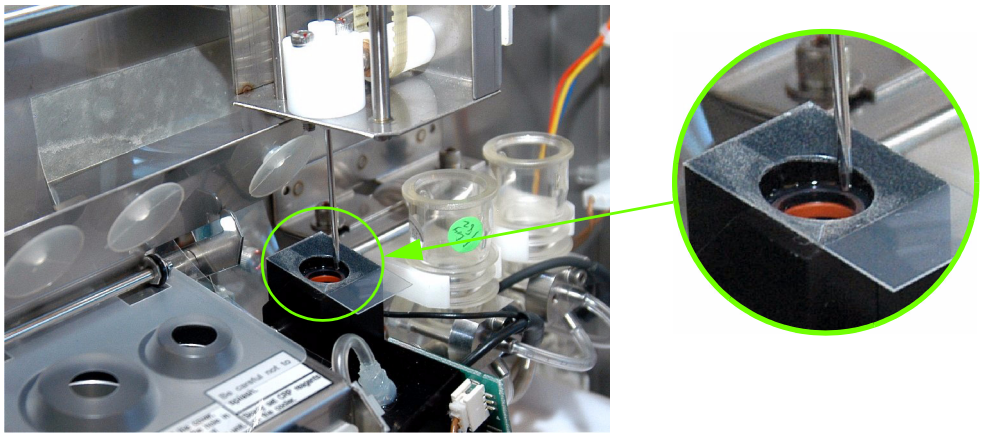


Fig.8: Needle on glass chamber

- Press the Enter key to continue.
- Needle moves up and carriage returns to home position.
- Adjustment values are displayed:
  - WBC display shows «CRP needle» value
  - RBC display shows «CRP carriage» value
- Write down both value and validate to exit function.
- Enter F[57] function, press Enter.
- Carriage is moved over CRP glass chamber and needle is coming down into it.
- Check that needle is well centered into the CRP glass chamber.
- Close sampling door and press Enter:
  - The needle is going inside CRP-R2 chamber.
- Press Enter:
  - The needle is going inside CRP-R3 chamber.
- Press Enter:
  - The needle is going inside CRP-R1 chamber.
- Press Enter to exit.
- If needle is not well centered, enter F[59] function and press Enter:
  - Needle is too much backward: decrease «CRP carriage» value by the meaning of Up and Down keys (1 step for 0.1mm).

or

  - Needle is too much forward: increase «CRP carriage» value by the meaning of Up and Down keys (1 step for 0.1mm).

- If needle is too low or too high, enter F[58] function and press Enter:
  - Needle is too much down: decrease «CRP needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
  - Needle is too much up: increase «CRP needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
- Write down this value and press Enter to exit function.
- Restart F[57] function and repeat until you get a correct adjustment.

The needle must not touch the bottom of the CRP chamber.Those values are «CRP Needle» and «CRP Carriage» values on configuration ticket.

6. Needle and carriage location over CRP-R2 reagent chamber adjustment

Make sure that there is no CRP reagent vial in CRP assy.

- Remove the CRP plastic cover.
- Enter F[5a] function, press Enter.
- Carriage is moved over CRP-R2 reagent chamber.
- Manually move down needle into chamber (See "Fig.9: CRP-R2 needle location, page 7").

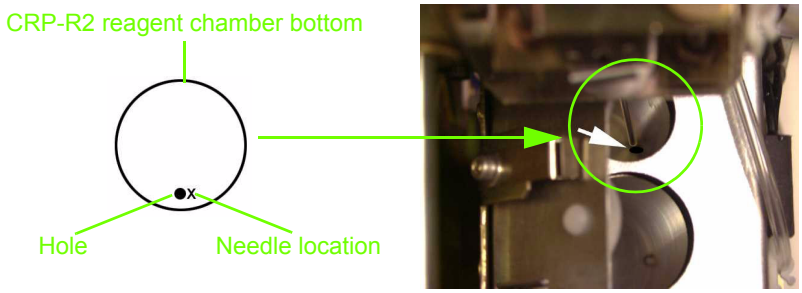


Fig.9: CRP-R2 needle location

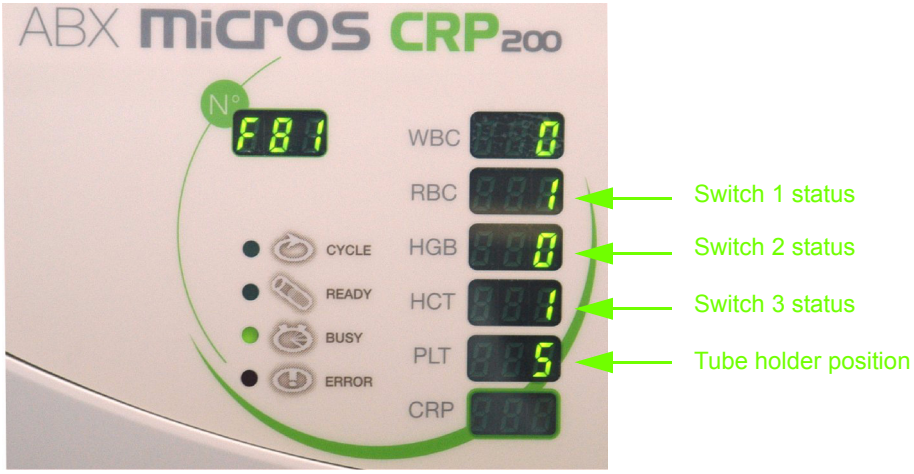
Becareful to be out of small hole on bottom of CRP-R2 chamber.

- Press the Enter key, needle moves up and carriage returns to home position.
- Adjustment value is displayed on Tube number and WBC displays.
- Check the new adjustment, install an empty reagent vial into CRP-R2 Chamber and enter F[57] function, press Enter.
- Check that the needle is not touching the bottom of the vial.
- If needle is not well located, enter F[5b] function and press Enter:
  - Needle is too much down: decrease «R2 needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
  - Needle is too much up: increase «R2 needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
- Write down this value and press Enter to exit function.

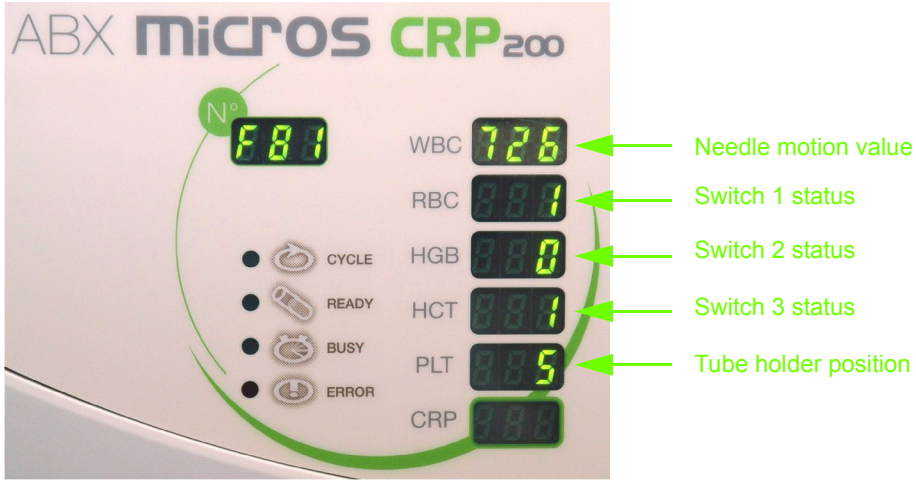
This value is «Needle R2» value in configuration ticket.

7. Needle depth adjustment

- Enter F[81] function, press Enter.
- Close the tube holder.
- Manually move down needle into the tube holder until contact with the bottom of one hole (in any tube holder position).
- Press Enter: The status of the switches and the tube holder position are dispayed.



- Press Enter again: Needle moves up and needle motion value is displayed in WBC window.



- Press Enter: Sampling door is open and value is stored for the corresponding position.

If the needle motion value is more than 3 digits, the fourth digit is displayed in N° window.

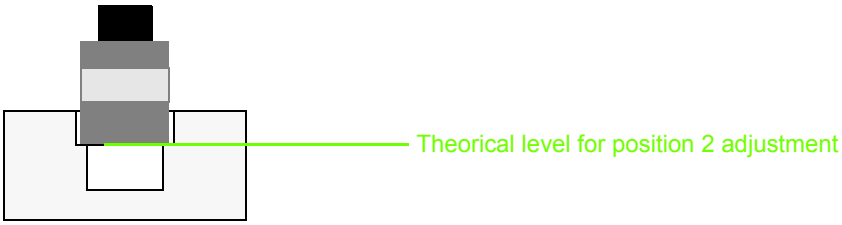
- Check for each tube holder position the value is in the following limits:
  - Position 2: Limit values: mini. 584 maxi. 606.
  - Position 4: Limit values: mini.1029 maxi. 1043.
  - Position 5: Limit values: mini. 644 maxi. 665.
  - Position 6: Limit values: mini. 931 maxi. 952.

Switch 1	Switch 2	Switch 3	Sampling position
0	0	0	Bad position of the tube holder
0	1	0	Position 2
0	0	1	Position 4
1	0	1	Position 5
0	1	1	Position 6
1	1	1	No tube holder

- Enter F[82] function to check correct adjustment.
- Press Enter, move by hand the needle: It must not touch the bottom of the hole.
- Repeat this operation for each position.

Specific adjustment for control blood position:

If needle touchs the bottom of the control blood vial, or if the control blood vial is not well emptied, perform the following adjustment:



- Enter F[81] function to adjust control blood tube holder's position 2.
- Install an empty vial in position 2 of the tube holder, close the tube holder and press Enter: the tube holder position is displayed.
- Manually move the needle down, inside the vial, then press Enter: the needle moves up and the value is displayed.
- Write down this value and enter F[84] function.
- Into F[84] function, enter previous «Value + 20steps» (for the vial bottom thickness) then press Enter.
- Enter F[82] function to check correct adjustment with the empty vial.
- Press Enter,the needle moves down.
- Manually move the needle: it must not touch the bottom of the vial.
- Press Enter, the needle goes up and the tube holder opens.
- Repeat these operations until the adjustment is correct.

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Main board & CRP board

- Concerns
  - Mother board and CRP board adjustment & check
- Required tools
  - Hexagonal keys
  - Voltmeter
  - Flat screwdriver
- Required products
  - WBC Latex
  - RBC/PLT Latex
- Intervention time
  - 1 hour
- Frequency
  - On request
- Specific kit or consumables
  - WBC Latex: LAD001DS
  - RBC/PLT Latex: LAD002BS

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Mother board general view

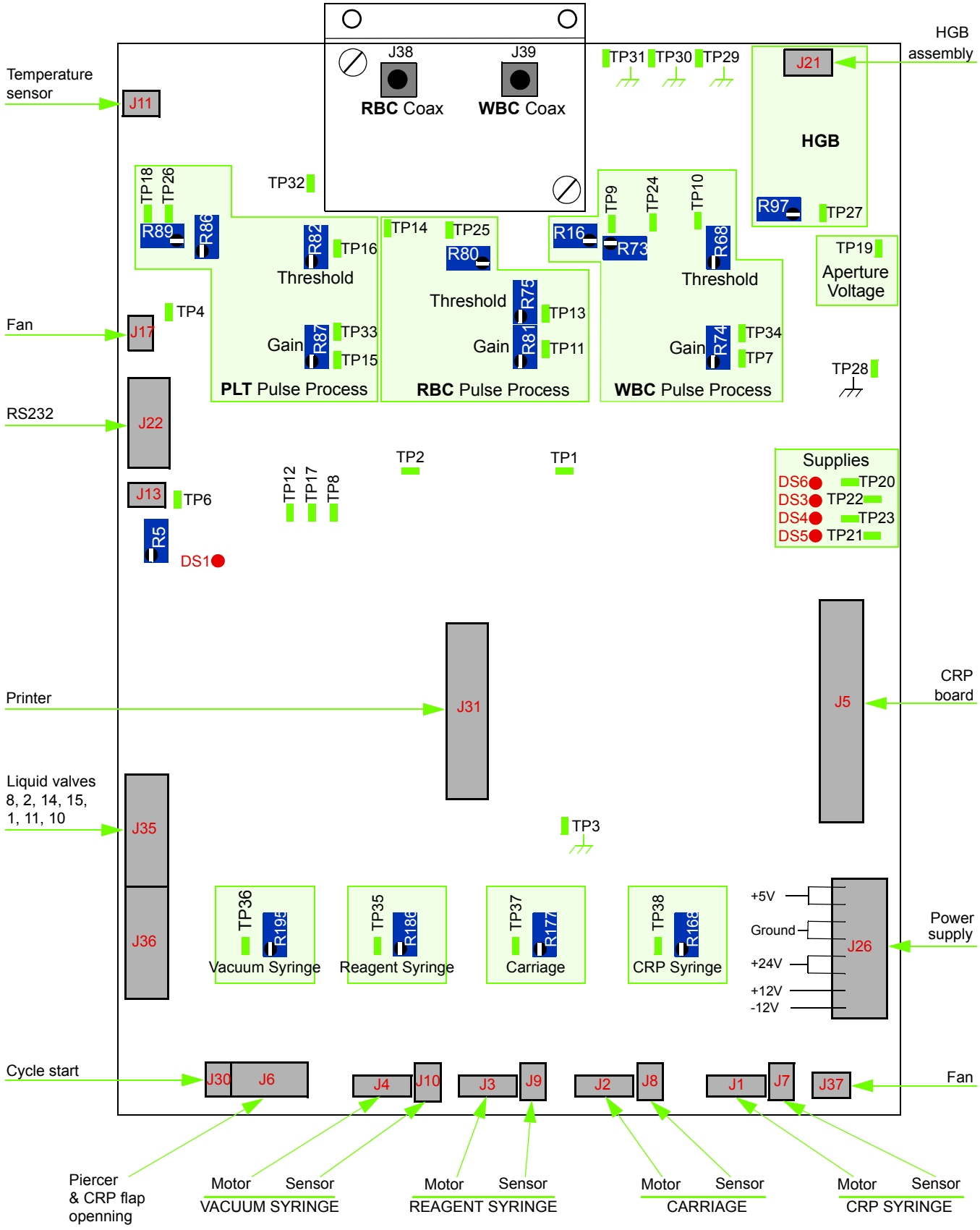

Fig.1: Mother board

2. WBC/RBC/PLT thresholds adjustment

2.1. WBC Threshold Adjustment

Target: 280 mV +/-5

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP10 and TP31 (Ground) WBC threshold.
- If necessary adjust WBC threshold by R68 potentiometer on mother board (See "Fig.1: Mother board, page 2").

2.2. RBC Threshold Adjustment

Target: 400 mV +/-5

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP13 and TP31 (Ground) RBC threshold.
- If necessary adjust RBC threshold by R75 potentiometer on mother board (See "Fig.1: Mother board, page 2").

2.3. PLT Threshold Adjustment

Target: 180 mV +/-5

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP16 and TP31 (Ground) PLT threshold.
- If necessary adjust PLT threshold by R82 potentiometer on mother board (See "Fig.1: Mother board, page 2").

3. Motor voltages adjustment

3.1. Vacuum Syringe

Target: 2.5V +/- 0.05

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP36 and TP31 (Ground) Vacuum syringe motor voltage.
- If necessary adjust Vacuum syringe motor voltage by R195 potentiometer on mother board (See “Fig.1: Mother board, page 2”).

3.2. Reagent Syringe

Target: 2.5V +/- 0.05

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP35 and TP31 (Ground) Reagent syringe motor voltage.
- If necessary adjust Reagent syringe motor voltage by R186 potentiometer on mother board (See “Fig.1: Mother board, page 2”).

3.3. Carriage

Target: 1.5V +/- 0.05

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP37 and TP31 (Ground) Carriage motor voltage.
- If necessary adjust Carriage motor voltage by R177 potentiometer on mother board (See “Fig.1: Mother board, page 2”).

3.4. CRP Syringe

Target 1V +/- 0.05

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP38 and TP31 (Ground) CRP syringe motor voltage.
- If necessary adjust CRP syringe motor voltage by R168 potentiometer on mother board (See “Fig.1: Mother board, page 2”).

3.5. Needle Carriage

No adjustment required for needle carriage motor.

4. Pressure sensor adjustment

Target: 1.7V +/- 0.1

- Remove the MICROS CRP cover.
- Switch on instrument.
- Disconnect the second tubing from the top of the vacuum syringe (See "Fig.2: vacuum syringe, page 5").

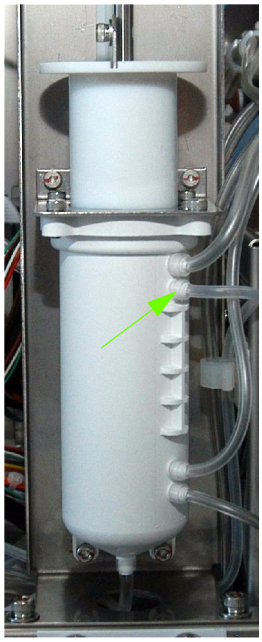

Fig.2: vacuum syringe

- Check, on CRP board, between TP16 and TP6 (Ground) Pressure sensor voltage.
- If necessary adjust Pressure sensor voltage by VR2 potentiometer on CRP board (See "Fig.1: Mother board, page 2").

The adjustable range of VR2 is 270 degrees. Attempting to turn it in excess will damage VR2.

5. Power supply voltages check

No adjustment available for power supply voltages.

5.1. Power supply - 12 V

Target check: -12V +/- 0.5

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP20 and TP31 (Ground) -12V Power suply voltage (See “Fig.1: Mother board, page 2”).

5.2. Power supply + 12 V

Target check: +12V +/ -0.5

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP21 and TP31 (Ground) +12V Power suply voltage (See “Fig.1: Mother board, page 2”).

5.3. Power Supply +24V

Target check: 24V +2/-1

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP22 and TP31 (Ground) +24V Power suply voltage (See “Fig.1: Mother board, page 2”).

5.4. Power Supply +5V

Target check: 5V +/- 0.15

- Remove the MICROS CRP cover.
- Switch on instrument.
- Check between TP23 and TP31 (Ground) +5V Power suply voltage (See “Fig.1: Mother board, page 2”).

6. Aperture voltage check

Target check 60V -1.5/+2.8

- Remove the MICROS CRP cover.
- Switch on instrument then enter F[63] function.
- Check between TP19 and TP31 (Ground) +60V Aperture voltage (See “Fig.1: Mother board, page 2”).

7. CRP blank adjustment

- Run a diluent priming (F[13] function).
- Enter F[91] function Photometer adjustment.
- The instrument automatically fills the flow cell with diluent and shows the CRP blank value on WBC display.
- Perform F[91] five times in order to check the repetability of values, and verify that the value does not fall more than 10 within 30 seconds.
- By means of VR1 on CRP board (See "Fig.3: CRP board, page 7") adjust displayed value to 3800 +/-10.

The adjustable range of VR1 is 270 degrees. Attempting to turn it in excess will damage VR1.

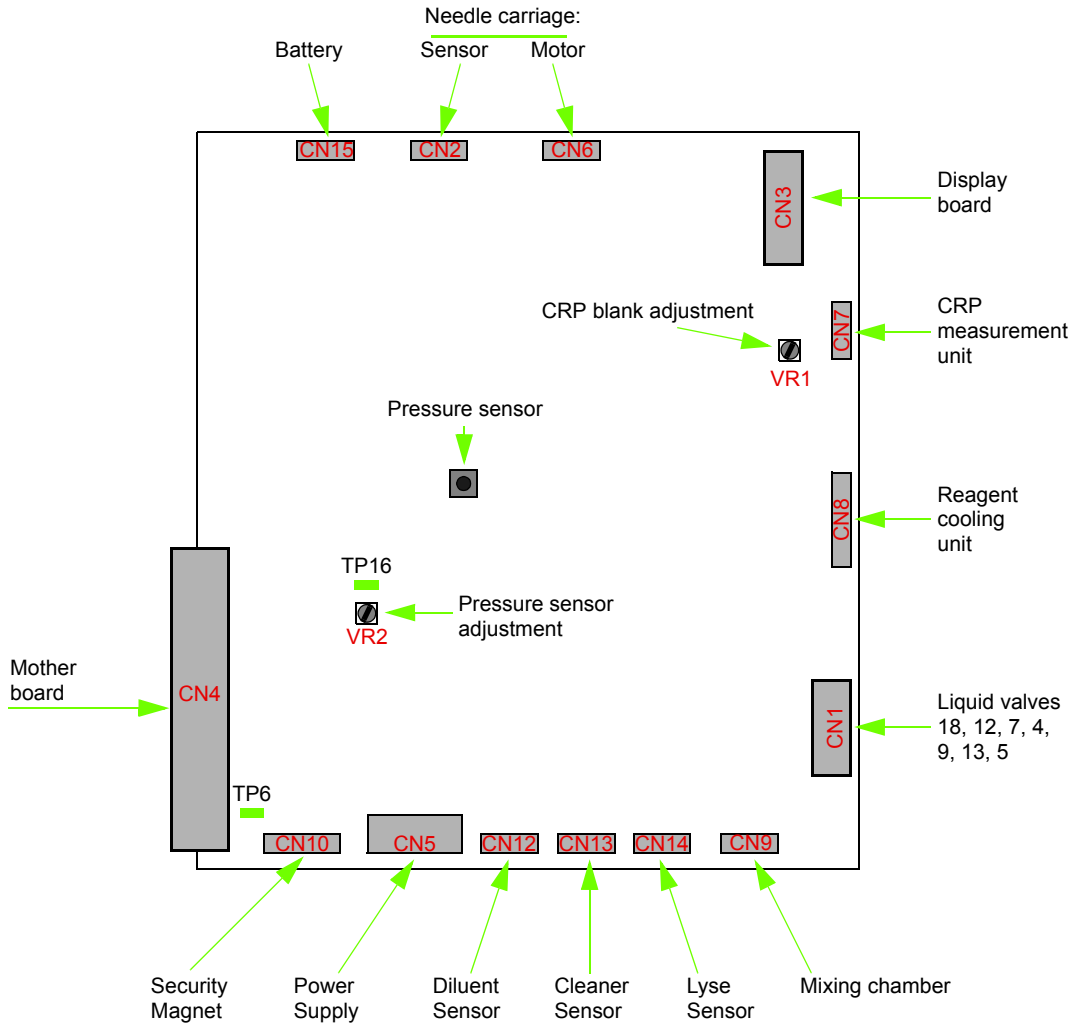

Fig.3: CRP board

8. HGB photometer adjustment

The HGB photometer calibration must be done 20 min at least after the instrument has been switched on. This adjustment must be done with the WBC chamber cover installed ! If the WBC chamber has been dismantled previously, make sure no liquid has flown in between the spectrophotomer and the chamber. Clean the inner surfaces of the spectrophotometer as well as the chamber. Reassemble the assy and tighten the two screws to the following torque: 400mN.m

- Remove the MICROS CRP cover.
- Dismantle the WBC/HGB chamber cover.
- Check the general cleanliness of the WBC chamber/spectrophotometer assy.
- Re-install the chamber cover.
- Switch on instrument.
- Run F[62] function: HGB photometer adjust (after 40 seconds approximately, the function is automatically exited).
- The curent channel is displayed on HGB display (See "Fig.4: HGB display, page 8").

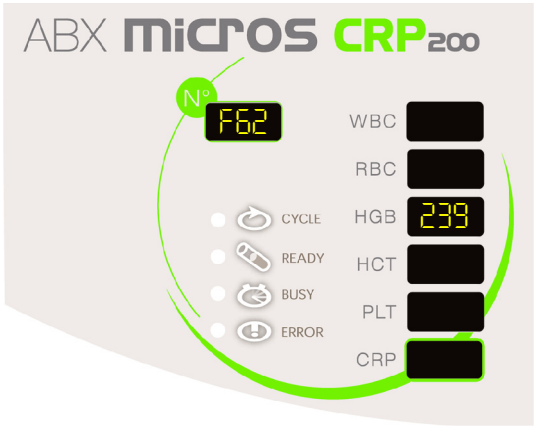

Fig.4: HGB display

- By means of R97 (See "Fig.1: Mother board, page 2") adjust the HGB channel according to the room temperature using the following chart table.
-

Tab.RAS262-1: HGB channel

Temperature room	Channel		
	Mini	Nominal	Maxi
15	240	245	250
16	240	245	250
17	239	244	249
18	238	243	248
19	237	242	247
20	236	241	246
21	235	240	245
22	234	239	244

Temperature room	Channel		
	Mini	Nominal	Maxi
23	234	239	244
24	233	238	243
25	232	237	242
26	231	236	241
27	230	235	240
28	229	234	239
29	228	233	238
30	228	233	238
31	227	232	237
32	226	231	236
33	225	230	235
34	224	229	234
35	223	228	233

9. WBC latex adjustment

As the WBC gain is a factory adjustment, it is mandatory not to readjust it without taking the following precautions:
- Carry out previously an autoconcentrated cleaning to make sure of the cleanliness of the WBC counting circuit (If necessary clean the WBC chamber aperture).
- Do not operate gain adjustment as long as the lympho and granulo values are not stable.
- Make sure the Latex has been thoroughly mixed before.

- Remove the MICROS CRP cover.
- Switch on instrument.
- Run F[64] function: WBC Latex Adjust. (This function allows the dilution of latex in diluent and displays Lymphocyte and Granulocyte volumes on screen every 3 seconds).
- Value blinking in WBC display shows the LYM target depending on the Latex lot used, usually 52 +/-1, if necessary you can change this value by the mean of Up and Down keys.
- Press Enter.
- Value blinking in RBC display shows the GRA target depending on the Latex lot used, usually 183 +/-2, if necessary you can change this value by the mean of Up and Down keys.
- Press Enter, the instrument is ready to sample WBC latex (LYM or GRA).
- Locate GRAN latex vial in tube holder and close sampling door (cycle duration: 3 min).
- RBC display shows the actual measurement of the GRA latex volume.
- When value is stable, adjust GRA gain (183 +/-2) by means of R74 potentiometer on mother board (See "Fig.1: Mother board, page 2").
- At the end of the cycle, average volumes and distribution curve are printed out.
- Run F[64] function again, using LYM latex.

- Check LYM value displayed in WBC window. The value must be 52 +/-1.
- If the LYM value displayed in WBC window is out of range (52 +/-1), run F[64] function again, using GRA latex, and adjust GRA gain (183 +/-2) by mean of R74 potentiometer on mother board.
- Run F[64] function again, using LYM latex, and check LYM value displayed in WBC window.

For WBC gain, the adjustment should only be done on GRA latex solution.
The LYM latex solution is used to check LYM gain only.
Never adjust WBC gain on LYM latex solution.

10. RBC/PLT latex adjustment

As the RBC/PLT gain is a factory adjustment, it is mandatory not to readjust it without taking the following precautions:
- Carry out previously an autoconcentrated cleaning to make sure of the cleanliness of the RBC/PLT counting circuit.
If necessary clean the RBC/PLT chamber aperture as described in the procedure CHAMBER MAINTENANCE of this manual.
Do not operate gain adjustment as long as the RBC and PLT values are not stable, Make sure the Latex has been thoroughly mixed before.

- Remove the MICROS CRP cover.
- Switch on instrument.
- Run F[65] function: RBC/PLT Latex Adjust. (This function allows the dilution of latex in diluent and displays RBC and PLT volumes on screen every 3 seconds).
- Value blinking in WBC display shows the RBC target depending on the Latex lot used, usually 74 +/-1, if necessary you can change this value by the mean of Up and Down keys.
- Press Enter.
- Value blinking in RBC display shows the PLT target depending on the Latex lot used, usually 64 +/-1, if necessary you can change this value by the mean of Up and Down keys.
- Press ENTER, the instrument is ready to sample RBC/PLT latex.
- Locate Latex vial in tube holder and close sampling door (cycle duration: 3min).
- WBC and RBC displays show the actual measurement of the latex volume.
- Adjust RBC gain by means of R81 potentiometer on mother board and PLT gain by means of R87 potentiometer (See “Fig.1: Mother board, page 2”).
- At the end of the cycle average volumes and distribution curves are printed out.

11. Summary adjustment table

Adjustment	Test point (TPxx) or function (Fxx)	Ground	Potentiometer	Target value
WBC threshold	TP10	TP31	R68	280 mV +/-5
WBC gain (latex)	F64		R74	LYM = 52 +/-1 GRA = 183 +/-2
RBC threshold	TP13	TP31	R75	400 mV +/-5
RBC gain	F65		R81	74 +/-1
PLT threshold	TP16	TP31	R82	180 mV +/-5
PLT gain	F65		R87	64 +/-1
Vacuum syringe motor voltage	TP36	TP31	R195	2.5V +/- 0.05
Reagent syringe motor voltage	TP35	TP31	R186	2.5V +/- 0.05
Carriage motor voltage	TP37	TP31	R177	1.5V +/- 0.05
CRP syringe motor	TP38	TP31	R168	1.0V +/- 0.05
Needle motor voltage	No adjustment required.			
Pressure sensor	TP16 (on CRP board)	TP6 (on CRP board)	VR2 (on CRP board)	1.7V +/- 0.1
Power supply (check)	TP20	TP31	No adjustment	-12 V +/- 0.5
	TP21	TP31	No adjustment	+12 V +/- 0.4
	TP22	TP31	No adjustment	+24 V +2/-1
	TP21	TP31	No adjustment	+5 V +/-0.15
CRP blank	F91		VR1 (on CRP board)	3800 +10
HGB photometer	F62		R97	See "Tab.RAS262-1: HGB channel, page 8"
Aperture voltage (check)	TP19 (F63)	TP31		60V -1.5/+2.8

Micros CRP 200

RAS263C

Vacuum check

- Concerns
  - Vacuum check
- Required tools
  - Hexagonal keys
  - Barflex
- Required products
  - None
- Intervention time
  - 15min
- Frequency
  - None
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Vacuum check

Vacuum target: from -220 mb to -190 mb

- Open the cover.
- Switch on the instrument.
- Disconnect second inlet from the top and connect the Barflex instead (See "Fig.1: Second inlet, page 2").

Fig.1: Second inlet

- Run F[69] function: Pressure check
- Press ENTER, the busy led is blinking and Vacuum syringe goes up to generate vacuum.
- Check that vacuum value read on the Barflex is within the following range: from -220 mb to -190 mb
- Wait for 30s at least to check the stability of the vacuum:
  - The vacuum drop down must be less than 2 mb.
- Press ENTER to exit function.
- Disconnect the Barflex and connect back the tube on the Vacuum syringe.

If vacuum is not within the range check the O'ring and the tube watertightness

Micros CRP 200

RAS264C

Bubbling adjustment

- Concerns
  - Bubbling adjustment
- Required tools
  - Hexagonal keys
- Required products
  - None
- Intervention time
  - 10 mn
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Bubbling adjustment

Two bubbling phasis are adjustable:

- Bubbling 1 is the first dilution (WBC/HGB chamber) bubbling value
- Bubbling 2 is the second dilution (WBC/HGB chamber + lyse) value and RBC chamber bubbling value.

Both values correspond to a number of steps carried out by the vacuum syringe.

Bubbling range:

- Bubbling 1: Between 150 and 200
- Bubbling 2: between 80 and 140

- Remove the MICROS CRP cover.
- Switch on instrument.
- Run F[66] function (See “Fig.1: WBC bubbling display, page 2”):

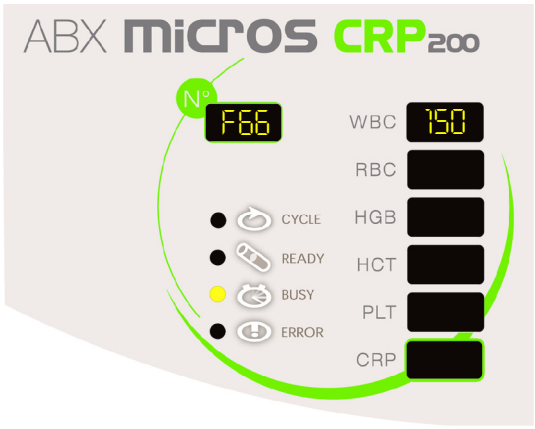

Fig.1: WBC bubbling display

This value is factory adjusted, and may be different from the default values shown above. It should be modified only when hematologic erroneous results are given by the instument: If bubbling is too important, liquid overflows can occur or if bubbling is too low, homogeneity of the dilution can be decreased.

- Increase or decrease Bubbling 1 value blinking in WBC display with Up and Down keys.
- Press Enter to display Bubbling 2 value in RBC display (See “Fig.2: RBC bubbling display, page 3”).

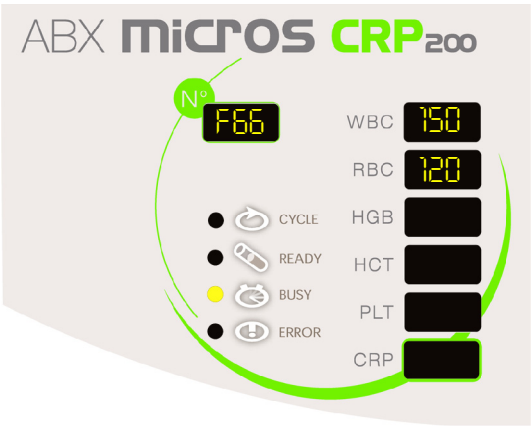

Fig.2: RBC bubbling display

This value is factory adjusted, and may be different from the default values shown above. It should be modified only when hematologic erroneous results are given by the instument: If bubbling is too important, liquid overflows can occur or if bubbling is too low, homogeneity of the dilution can be decreased.

- Increase or decrease Bubbling 2 value blinking in RBC display with Up and Down keys.
- Press Enter to exit function.

Micros CRP 200

RAS265C

Thermic adjustment

- Concerns
  - Thermic adjustment
- Required tools
  - Hexagonal keys
  - Thermometer
- Required products
  - None
- Intervention time
  - 30 mn
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Diluent temperature sensor adjustment

- Plunge thermometer probe deeply into diluent container.
- Run 2 Diluent prime F[13] functions.
- Enter F[67] function: Temperature calibration (See “Fig.1: F67 display, page 2”).

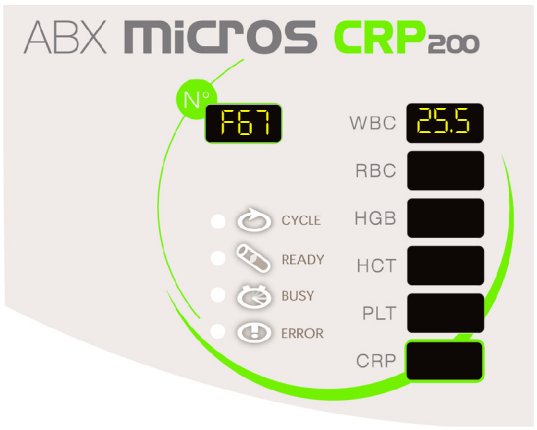

Fig.1: F67 display

- Temperature is displayed on WBC display.
- With Up and Down keys, input temperature read on thermometer and press Enter.

Temperature must be input as quickly as possible after priming. If not, diluent temperature will raise in sensor.

- Run 2 Diluent prime F[13] functions.
- Enter F[68] function: Temperature check (See “Fig.2: F68 display, page 2”).

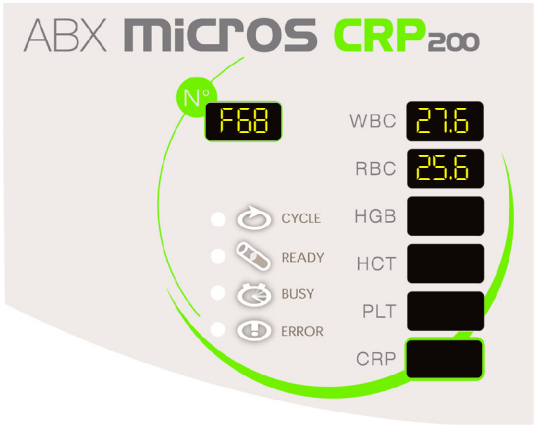

Fig.2: F68 display

- Temperature without correction is displayed on WBC display.
- Corrected temperature is displayed on RBC display.
- Check temperatures between RBC display and thermometer then press Enter.

2. Diluent temperature in CRP chamber check

- Remove the instrument cover.
- Plunge thermometer probe deeply into CRP chamber (See “Fig.3: CRP chamber temperature, page 3”).

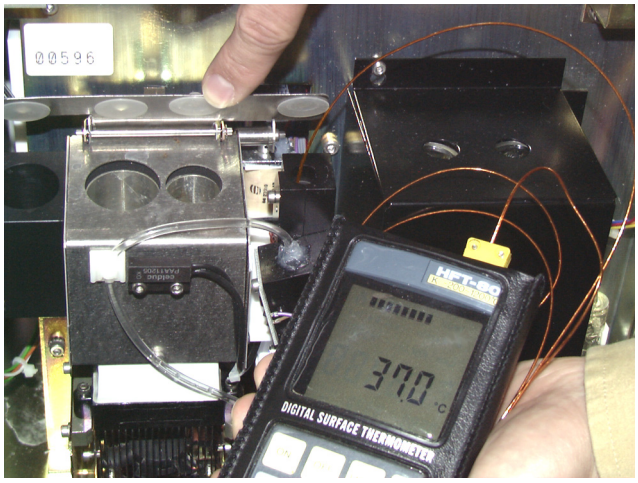

Fig.3: CRP chamber temperature

Instrument must be switched on for about 15min at least to reach its correct temperature.

- Run F[96] function: Cooler / Heater check (See “Fig.4: F96 CRP diluent, page 3”).

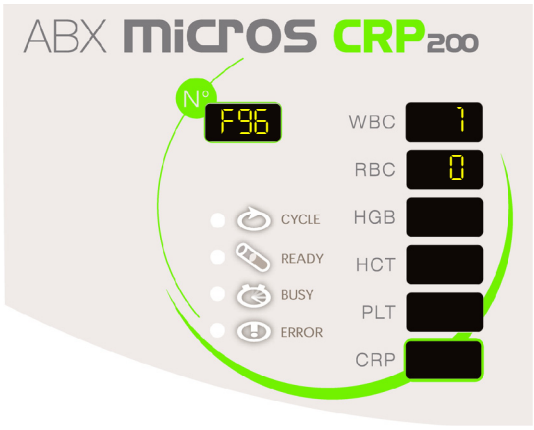

Fig.4: F96 CRP diluent

The WBC and RBC displays must be blinking between 0 and 1.

- Check temperature on thermometer, temperature must be between 36°C (97°F) and 38°C (100°F).

Fig.5: R66 on CRP board

3. CRP reagents temperature check

- Remove the instrument cover.
- Plunge thermometer probe between CRP reagent bottle and CRP block (See “Fig.6: CRP reagent temperature, page 4”).

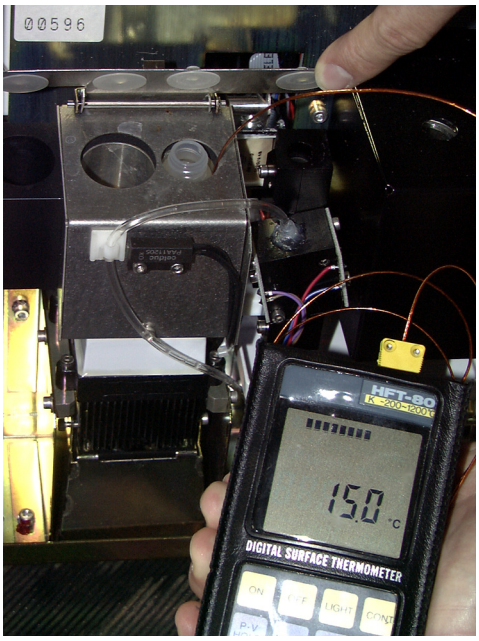

Fig.6: CRP reagent temperature

Instrument must be switched on for about 15 min at least to reach its correct temperature.

- Run F[96] function: Cooler / Heater check (See “Fig.7: F96 CRP reagent, page 4”).

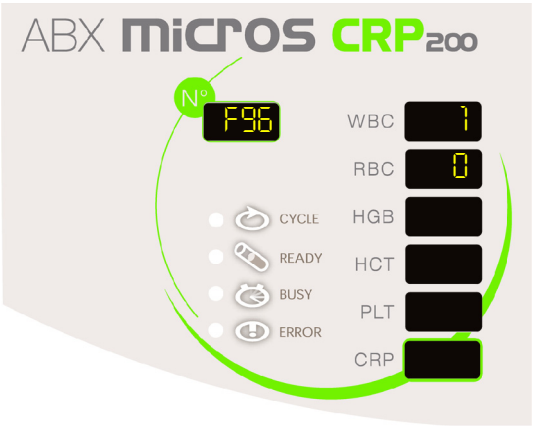

Fig.7: F96 CRP reagent

The WBC and RBC displays must be blinking between 0 and 1.

Micros CRP 200

RAS268C

Front panel dismantling

- Concerns
  - Front panel
- Required tools
  - Hexagonal keys
  - Dynamometric screw driver A302, A301, A300
  - Flat screw driver
  - Torx keys
- Required products
  - None
- Intervention time
  - 10 mn
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Front panel dismantling

- Switch off the instrument and disconnect the power supply cable.
- Open the front reagent door and remove the 2 bottles (disconnect tube on the stopper).
- Unscrew the 6 CHC cover screws with their washers (See “Fig.1: cover screws, page 2”), then remove the cover.

Fig.1: cover screws

- Unscrew the 2 CHC M2.5x5 screws under the frame (See “Fig.2: below screws, page 2”).

Fig.2: below screws

- Push the carriage back and unscrew the 4 CHC M2.5x8 screws (See “Fig.3: Inside screws, page 2”).

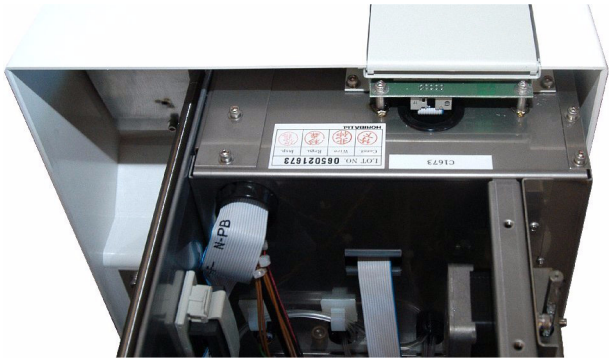

Fig.3: Inside screws

- Disconnect all wirings from the front panel board.
- Disconnect tube holder's microswitch wirings.
- Disconnect tube holder's openning system.
- Remove front panel carefully

2. Front panel mounting

- Reassemble following steps of chapter 1 backward.

Following diagram shows connections for tube holder's microswitchs and openning system (See "Fig.4: front panel connections, page 3").
Refer to the labels on wirings for connection.

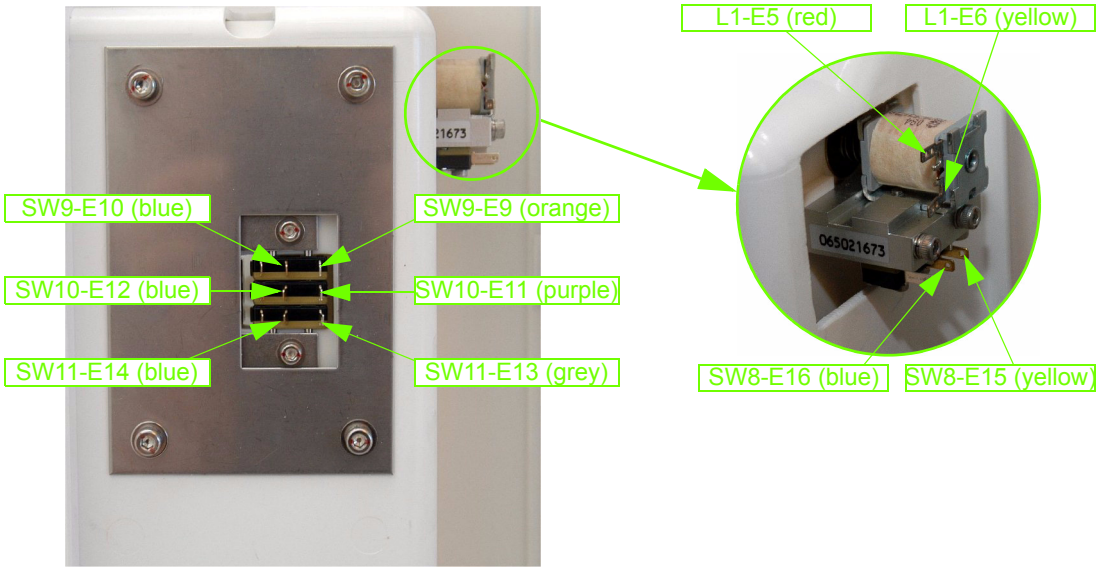

Fig.4: front panel connections

- Connect the 2 flat cables and the power supply cable on the Display board (See "Fig.5: Display board connections, page 3").

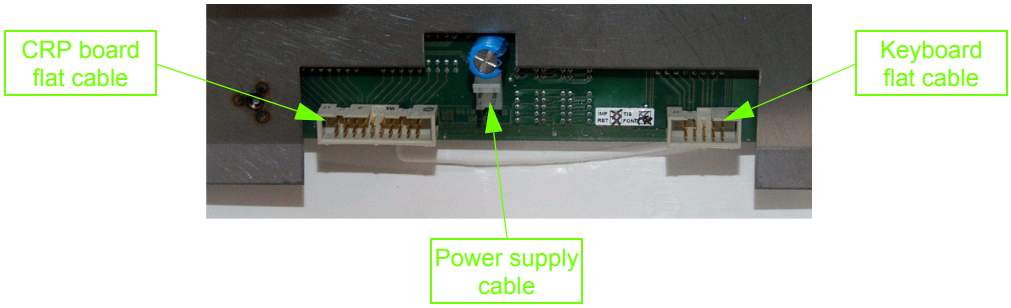

Fig.5: Display board connections

- Switch on the instrument.
- Check that all is operating normally.

Micros CRP 200

RAS273C

Autoconcentrated cleaning

- Concerns
  - Instrument cleaning
- Required tools
  - None
- Required products
  - Minoclair
- Intervention time
  - 15 mn
- Frequency
  - On request
- Specific kit or consumables
  - None

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. Concentrated cleaning

1.1. Drain all chamber

Switch on the instrument
Run a Startup cycle
Run F[12] function:Drain chamber

1.2. CBC Cleaning

Open the cover and remove the chamber cover
Fill RBC and WBC chamber with minoclair (5ml for each chamber)
Switch on the instrument
Run F[16] function: CBC bleach

1.3. CRP Cleaning

Fill CRP chamber with minoclair (5ml)
Run F[17] function: CRP bleach

Micros CRP 200

RAS445A

CRP unit replacement

- Concerns
  - CRP unit replacement
- Required tools
  - Hexagonal keys
- Required products
  - None
- Intervention time
  - 15 mn
- Frequency
  - On request
- Specific kit or consumables
  - CRP unit

Disposal gloves, eyes protection and lab coat must be worn by the operator.
Local or national regulations must be applied in all the operations.

1. CRP unit dismantling

- Turn off the instrument then disconnect the power supply cable.
- Open the cover.
- Unscrew the 2 CHC screws then remove the chamber cover (See "Fig.1: cover screws, page 2").

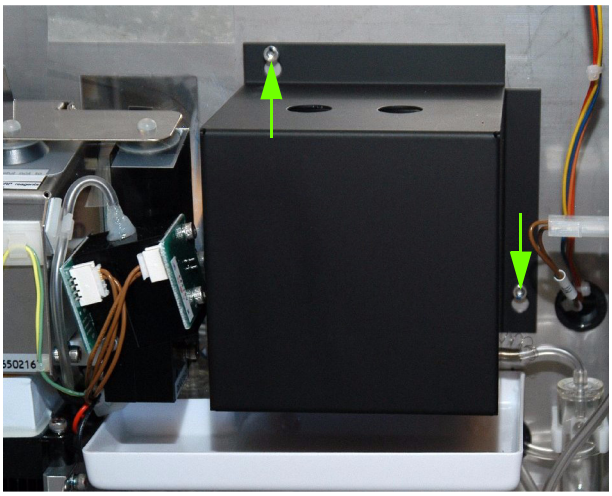

Fig.1: cover screws

- Remove the WBC and RBC chamber from the clamps (See "Fig.2: Chambers, page 2").

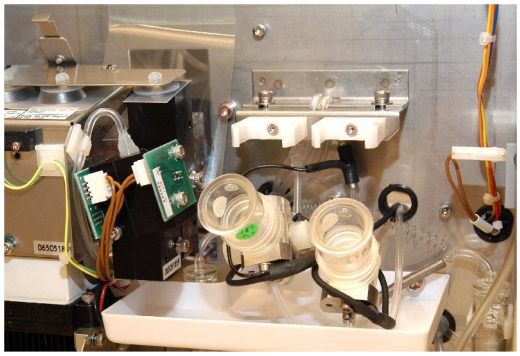

Fig.2: Chambers

- Disconnect the tubing from the «T» connector (T4-1) to the flowcell (See "Fig.3: tubing, page 2").

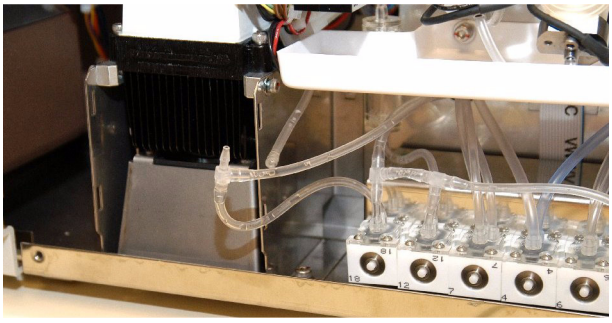

Fig.3: tubing

- Cut the tyraps then disconnect CN9 from the CRP board.
- Disconnect the connectors on the 2 boards of the CRP unit then unscrew the CHC screws (See "Fig.4: CRP board connectors, page 3").

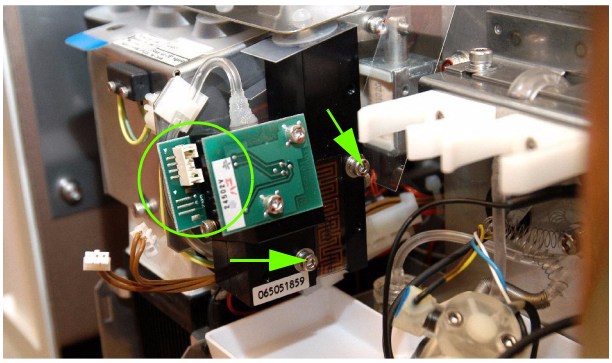

Fig.4: CRP board connectors

- Remove the CRP unit (See “Fig.5: CRP unit, page 3”).

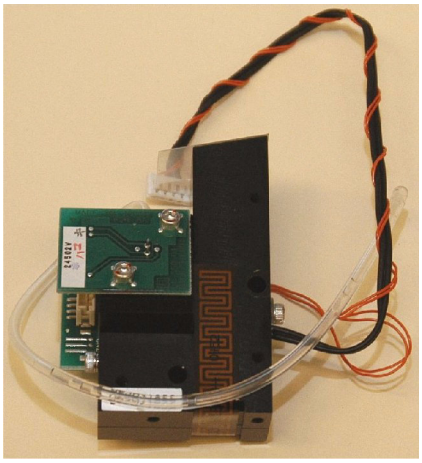

Fig.5: CRP unit

- Unscrew the CHC screws then remove the LED board and the PD board (See “Fig.6: boards, page 3”).

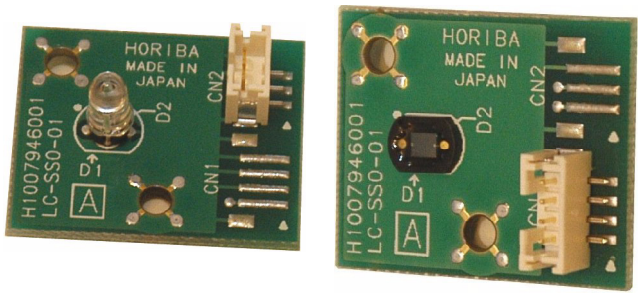

Fig.6: boards

2. CRP unit replacement

- Install those boards on the new CRP unit.
- Connect the connectors on the 2 boards.
- Install the new CRP unit with the two CHC screws (do not tight the screws).
- Pass the connector through the hole of the frame then connect it on the CRP board (CN9).
- Connect the tubing on the «T» connector then fix it in the clamp.
- Install the WBC and RBC chambers back into their respective clamp.

3. Adjustments

- Manually move the carriage over the CRP chamber then move the needle down.
- Adjust the CRP unit position to have the needle centered in the CRP chamber (See "Fig.7: needle centering, page 4") then tighten the screws.

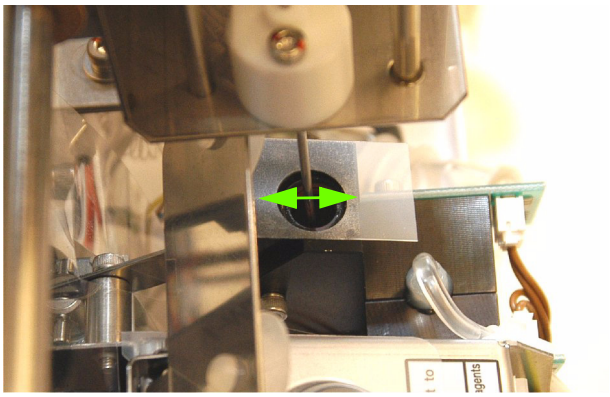

Fig.7: needle centering

- Manually move the needle up.
- Connect the power supply cable then turn on the instrument.
- Enter F[56] function, press Enter
- Carriage is moved over CRP glass chamber.
- Manually move on the right hand side the carriage and move down the needle until it touch the edge on the right hand side of glass chamber (See "Fig.8: Needle on glass chamber, page 4").

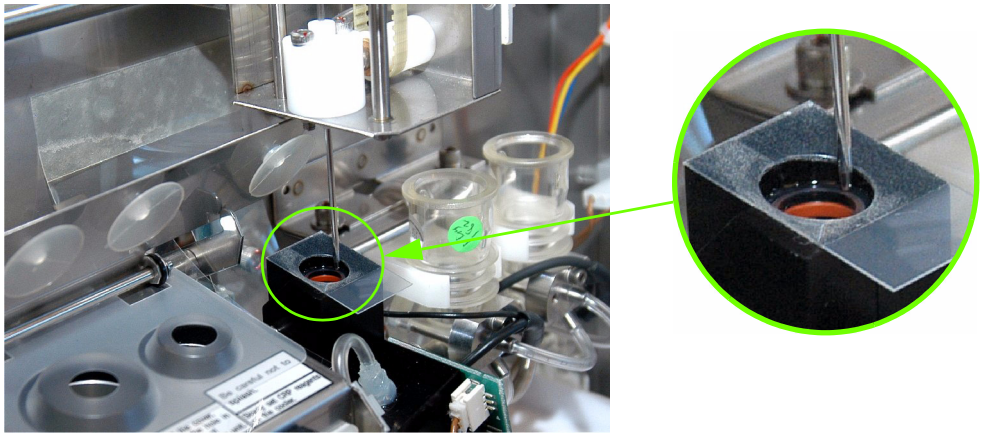

Fig.8: Needle on glass chamber

- Hit a key to continue.
- Needle moves up and carriage returns to home position.
- Adjustment values are displayed:
  - WBC display shows «CRP needle» value
  - RBC display shows «CRP carriage» value
- Write down both value and validate to exit function.
- Enter F[57] function, press Enter.

- Carriage is moved over CRP glass chamber and needle is coming down into it.
- Check that needle is well centered into the CRP glass chamber.
- Press Enter for all sequences.
- If needle is not well centered, enter F[59] function and press Enter:
  - Needle is too much backward: decrease «CRP carriage» value by the meaning of Up and Down keys (1 step for 0.1mm).

or

  - Needle is too much forward: increase «CRP carriage» value by the meaning of Up and Down keys (1 step for 0.1mm).
- If needle is too low or too high, enter F[58] function and press Enter:
  - Needle is too much down: decrease «CRP needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
  - Needle is too much up: increase «CRP needle» value by the meaning of Up and Down keys (1 step for 0.1mm).
- Write down this value and press Enter to exit function.
- Restart F[57] function and repeat until you get a correct adjustment.

The needle must not touch the bottom of the CRP chamber. Those values are «CRP Needle» and «CRP Carriage» values on configuration ticket.

- Put the black WBC & RBC cover back.
- Run a diluent priming (F[13] function).
- Enter F[91] function Photometer adjustment.
- The instrument automatically fills the flow cell with diluent and shows the CRP blank value on WBC display.
- During this cycle, the value displayed on WBC window will slowly decrease.
- Perform F[91] five times in order to check the repetability of values, and verify that the value does not fall more than 10 within 30 seconds.
- By means of VR1 on CRP board, adjust displayed value to 3800 +10.

The adjustable range of VR1 is 270 degrees. Attempting to turn it in excess will damage VR1.

Exploded views

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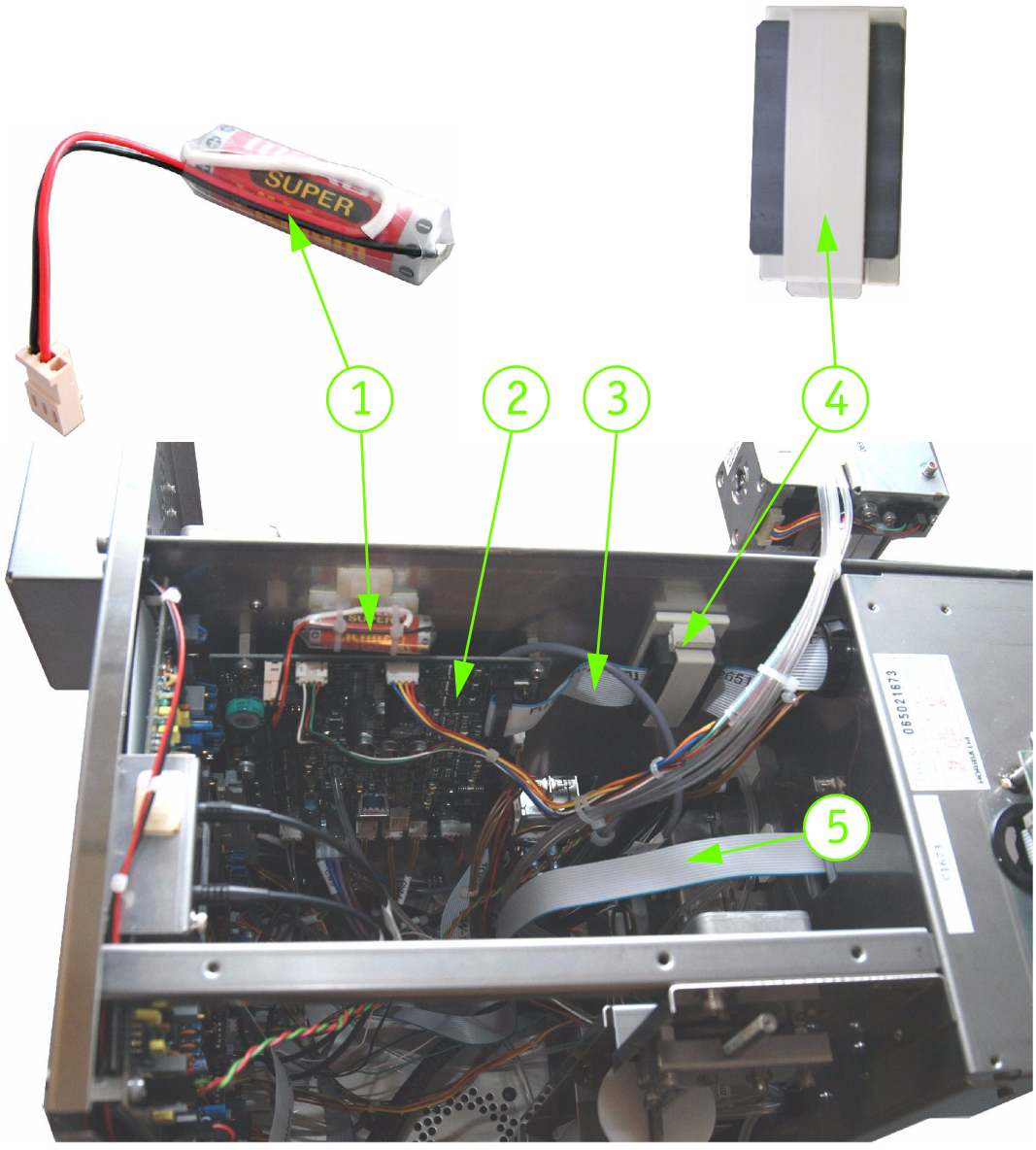
8.LV2 view, page 12	2	XCA167A	CHAMBER,ISOLATOR (SMALL)
8.LV2 view, page 12	3	XDA481B	VALVE,LIQ. 2WAYS/NC W/O COIL
8.LV2 view, page 12	4	XDA483B	VALVE,LIQ. 3WAYS W/O COIL
8.LV2 view, page 12	5	F0023485400	CUP,OVERFLOW RBC/WBC CRP200
8.LV2 view, page 12	6	XDA588CS	VALVE,7 LIQ VALVE ASSY(18,.,5)
9.RBC chamber view, page 13	1	XBA413A	CABLE,COAX RBC MICROS 60
9.RBC chamber view, page 13	2	FAA046A	O'RING,COAXIAL CABLE
9.RBC chamber view, page 13	3	XDA470ES	CHAMBER,RBC COMPLETE
9.RBC chamber view, page 13	4	GBG275A	O'RING, APERTURE D=0.5 P60/P80
9.RBC chamber view, page 13	5	GBC239A	CHAMBER,COUNTING HEAD MIC 60
9.RBC chamber view, page 13	6	H0525166003	CHAMBER,APERTURE 50µ

Drawing	N° in drawing	Reference	Designation
9.RBC chamber view, page 13	7	F2000037700	CHAMBER, RBC BODY CRP200
10.WBC chamber view, page 14	1	XBA412A	CABLE,COAX WBC MICROS 60
10.WBC chamber view, page 14	2	XDA472B	CHAMBER,HB ASSY MICROS 60
10.WBC chamber view, page 14	3	XDA471ES	CHAMBER,WBC/HB MICROS 60 CPTE
10.WBC chamber view, page 14	4	H0525166002	CHAMBER,APERTURE 80µ
10.WBC chamber view, page 14	5	GBG275A	O'RING, APERTURE D=0.5 P60/P80
10.WBC chamber view, page 14	6	GBC239A	CHAMBER,COUNTING HEAD MIC 60
10.WBC chamber view, page 14	7	FAA046A	O'RING,COAXIAL CABLE
11.Power supply view, page 15	1	DBM001A	SWITCH,POWER ON/OFF
11.Power supply view, page 15	2	E1000342800	PCB,POWER SUPPLY BOARD CRP200
11.Power supply view, page 15	3	DBK012A	CLIP,FAN HOLDER
11.Power supply view, page 15	4	DBK003A	ADHESIVE,HOLDER FOR FLAT CABLE
11.Power supply view, page 15	5	G0166270	FAN, POWER SUPPLY FAN CRP200
11.Power supply view, page 15	6	DBE018A	CABLE,BUSHING D=9,5 BLACK
12.Cooling fan view, page 16	1	G0172080	FAN, REAR FAN CRP200
12.Cooling fan view, page 16	2	H1008391001	COVER,REAR FAN PROTECTION CRP2
12.Cooling fan view, page 16	3	DBE018A	CABLE,BUSHING D=9,5 BLACK
12.Cooling fan view, page 16	4	G2002532	FAN, MAIN FAN FILTER ASSY CRP200
13.Reagent connection plate view, page 17	1	EAC010A	FITTING,LUER FEMALE I=3MM
13.Reagent connection plate view, page 17	2	F1000380800	FITTING,ANTI ROTATION WASHER
13.Reagent connection plate view, page 17	3	G0166210	REAGENT,CONNEXION PLATE CRP200
14.Front view, page 18	1	XBA281A	SENSOR,TEMPERATURE MIC./LC220
14.Front view, page 18	2	E1000117600	PROTECTION, SHIELD FOAM L=1M
14.Front view, page 18	3	CAG008A	SYRINGE,PLASTIC GUIDE L=63,5
14.Front view, page 18	4	DBE018A	CABLE,BUSHING D=9,5 BLACK
14.Front view, page 18	5	DBE017A	CABLE,BUSHING D=23,8 BLACK
14.Front view, page 18	6	DBE021A	CABLE,BUSHING D=12,7 BLACK
14.Front view, page 18	7	XDA589CS	VALVE,7 LIQ VALVE ASSY(10,.,8)
14.Front view, page 18	8	F1000386000	CUP,OVERFLOW SYRINGES CRP200
15.Display board view, page 19	1	E0013464600	PCB,DISPLAY BOARD CRP200
16.Syringe mechanical view, page 20	1	G0166330	MOTOR,STEP BY STEP+GEAR CRP200
16.Syringe mechanical view, page 20	2	G0167040	SENSOR,OPTIC CRP/DIL SYR. CRP200
16.Syringe mechanical view, page 20	3	H1008310001	SYRINGE,PULLEY SYR/LIQ+AIR CRP200
16.Syringe mechanical view, page 20	4	H1008311001	SYRINGE,WASHER SYR/LIQ+AIR CRP200
16.Syringe mechanical view, page 20	5	H1008333002	MOTOR,CROSSPIECE S/LIQ+AIR CRP200
16.Syringe mechanical view, page 20	6	H1008357001	SYRINGE,GEARING S/LIQ.+AIR CRP200
16.Syringe mechanical view, page 20	7	H1008359001	SYRINGE,COGGRAIL FOR LIQ. SYR.CRP200
16.Syringe mechanical view, page 20	8	H1008376001	MOTOR,REDUCTOR PLATE ASSY CRP200
16.Syringe mechanical view, page 20	9	G2002534	MOTOR,REDUCTOR 3 SYR CRP200
16.Syringe mechanical view, page 20	10	G2002535	MOTOR,REDUCTOR CRP SYR CRP200
16.Syringe mechanical view, page 20	11	H1001636001	SYRINGE,3 SYR.TRANS.GUIDE CRP200
16.Syringe mechanical view, page 20	12	H1008338002	SYRINGE,CRP TRANS.GUIDE CRP200
17.Carriage view, page 21	1	DBE014A	CABLE,BUSHING D=3,2 BLACK
17.Carriage view, page 21	2	F1000391700	BELT,NEEDLE 285MM CRP200
17.Carriage view, page 21	3	F1000391800	BELT,CARRIAGE 650MM CRP200

Drawing	N° in drawing	Reference	Designation
17.Carriage view, page 21	4	G0166610	MOTOR,STEPPER CRP200
17.Carriage view, page 21	5	G0166620	SENSOR,NEEDLE CARRIAGE CRP200
17.Carriage view, page 21	6	H1008358001	MOTOR,PULLEY (NEEDLE) CRP200
17.Carriage view, page 21	7	G2002319	KIT,PULLEY ASSY CRP200
18.CRP cold assy view, page 22	1	DAM007A	VALVE,SOLENOID CRP BLOCK
18.CRP cold assy view, page 22	2	H2003841001	REAGENT,SILICON STOPPER CRP200
18.CRP cold assy view, page 22	3	G2002533	CHAMBER, CRP COLD ASSY CRP200
19.Reagent sensor 1 view, page 23	1	G2002318	SENSOR, DILUENT SENSOR CRP200
19.Reagent sensor 1 view, page 23	2	H1008152001	CABLE, DILUENT SENSOR CRP200
20.Air syringe cup view, page 24	1	GBF070A	CUP,OVERFLOW AIR SYRINGE LC270
21.Air syringe view, page 25	1	FAA017A	O'RING,TANK MIN/AG+WASTE MIC
21.Air syringe view, page 25	2	GBC260AS	CHAMBER,INJ.WASTE/VAC.SYR.BODY
21.Air syringe view, page 25	3	G0166320	SENSOR,VAC/WASTE SYRINGE CRP200
21.Air syringe view, page 25	4	H1008317001	CHAMBER,WASTE/VAC. SYR. PISTON
21.Air syringe view, page 25	5	H1008355001	SYRINGE,COGGRAIL FOR AIR SYR.
21.Air syringe view, page 25	6	H1008373001	SENSOR, OPTIC DETECT TAB CRP200
21.Air syringe view, page 25	7	H2003334001	CHAMBER,WASTE CHICANE CRP200
21.Air syringe view, page 25	8	CAG008A	SYRINGE,PLASTIC GUIDE L=63,5
22.Main board view, page 26	1	DBK014A	CABLE,HOLDER RS FLAT CABLE
22.Main board view, page 26	2	DBK015A	CABLE,HOLDER PRINT. FLAT CABLE
22.Main board view, page 26	3		
22.Main board view, page 26	4		
23.Front panel view, page 27	1	G0332140	COVER,FRONT COVER ASSY CRP200
23.Front panel view, page 27	2	L0163761	COVER,FRONT REAGENT DOOR CRP200
23.Front panel view, page 27	3	L0338230	COVER, KEYBOARD CRP200
23.Front panel view, page 27	4	F0022990300	COVER,REAGENT DOOR LOCK CRP200
24.Sample holder view, page 28	1	CAE006A	SWITCH,MICROSWITCH XC5-81-82
24.Sample holder view, page 28	2	DAM006A	VALVE,SOLENOID MICROS CT PIERC
24.Sample holder view, page 28	3	G0166791	SAMPLING,BLOCK ASSY CRP200
24.Sample holder view, page 28	4	G0175390	SAMPLING,STANDARD TUBE HOLDER
24.Sample holder view, page 28	5	G0289970	SAMPLING,BRAKING GEAR + SPRING
24.Sample holder view, page 28	6	H1016977001	COVER,SAMPLING BLOCK DOOR CRP200
25.Cover view, page 29	1	F1001306800	COVER,SIDE DOOR LOCK ASSY CRP2
25.Cover view, page 29	2	G0166801	COVER, MAIN COVER ASSY CRP200
25.Cover view, page 29	3	H1031791001	COVER,CRP REAGENT DOOR CRP200
26.Back view, page 30	1	DAR014A	FUSE,3.15A (5X20)
26.Back view, page 30	2	E1000072400	FILTER,MAIN POWER CRP200
26.Back view, page 30	3	H1009391001	CABLE,RS232 OUTPUT CRP200
26.Back view, page 30	4	H1009392001	CABLE,PRINTER OUTPUT CRP200
27.Keyboard assy view, page 31	1	E0013099900	PCB,KEYBOARD BOARD CRP200
27.Keyboard assy view, page 31	2	E1000349200	CABLE,DISPLAY-KEYBOARD CRP200
27.Keyboard assy view, page 31	3	F0022990300	COVER,REAGENT DOOR LOCK CRP200
28.CRP unit view, page 32	1	G0166461	CHAMBER,ADJ. CRP UNIT ASSY UL
28.CRP unit view, page 32	2	G0166480	SENSOR,CRP DOOR SWITCH UL CRP200
28.CRP unit view, page 32	3	G0166511	CHAMBER,CRP READ.ASSY UL CRP200

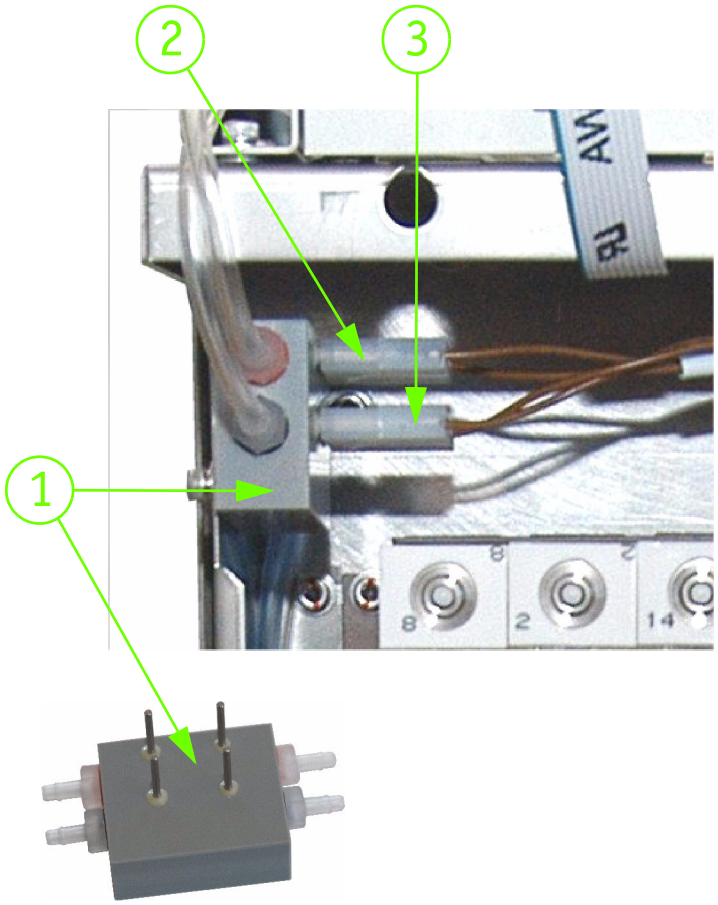
Drawing	N° in drawing	Reference	Designation
28.CRP unit view, page 32	4	G0332050	COVER,PLASTIC REAG.COVER CRP200
28.CRP unit view, page 32	5	H1008320001	CHAMBER,SAPONINE BOTTLE HOLDER
29.Right side view, page 33	1	H1008348001	CARRIAGE,BOTTOM HORIZ AXIS CRP
29.Right side view, page 33	2	H1008350001	CARRIAGE,TOP HORIZ AXIS CRP
29.Right side view, page 33	3	H1008389001	COVER,RBC/WBC BLACK COVER
30.Maintenance kit view, page 34	1	FAA017A	O'RING,TANK MIN/AG+WASTE MIC
30.Maintenance kit view, page 34	2	F0020373000	O'RING, DILUENT PISTON CRP200
30.Maintenance kit view, page 34	3	FAA036A	O'RING,FLOW CELL+LYSE DISP.MIC
30.Maintenance kit view, page 34	4	FAA046A	O'RING, COAXIAL CABLE
30.Maintenance kit view, page 34	5	FAA053A	O'RING, SAMPLING NEEDLE MICROS OT
30.Maintenance kit view, page 34	6	FAA055A	O'RING,MICROS SAMPLING SYRINGE
30.Maintenance kit view, page 34	7	H1008304002	SYRINGE, DILUENT PISTON (KELF)
30.Maintenance kit view, page 34	8	GBG275A	O'RING, APERTURE D=0.5 P60/P80
30.Maintenance kit view, page 34	9	XEA931AS	KIT, YEARLY MAINTENANCE CRP2001
31.Printer view, page 35	1	CBE053A	PRINTER,SEIKO DPU414 W/O CORD
31.Printer view, page 35	2	CBE057A	PRINTER,DPU414 SUPPLY 220V/6V
31.Printer view, page 35	3	CBE058A	PRINTER,DPU414 SUPPLY 110V/6V
32.Straw and tubing view, page 36	1	XDA693A	TUBING,WASTE P60/CRP200
32.Straw and tubing view, page 36	2	GBC284A	REAGENT,STRAW CLEANER CRP200
32.Straw and tubing view, page 36	3	GBC285A	REAGENT,STRAW WASTE CRP200

2. CRP board view



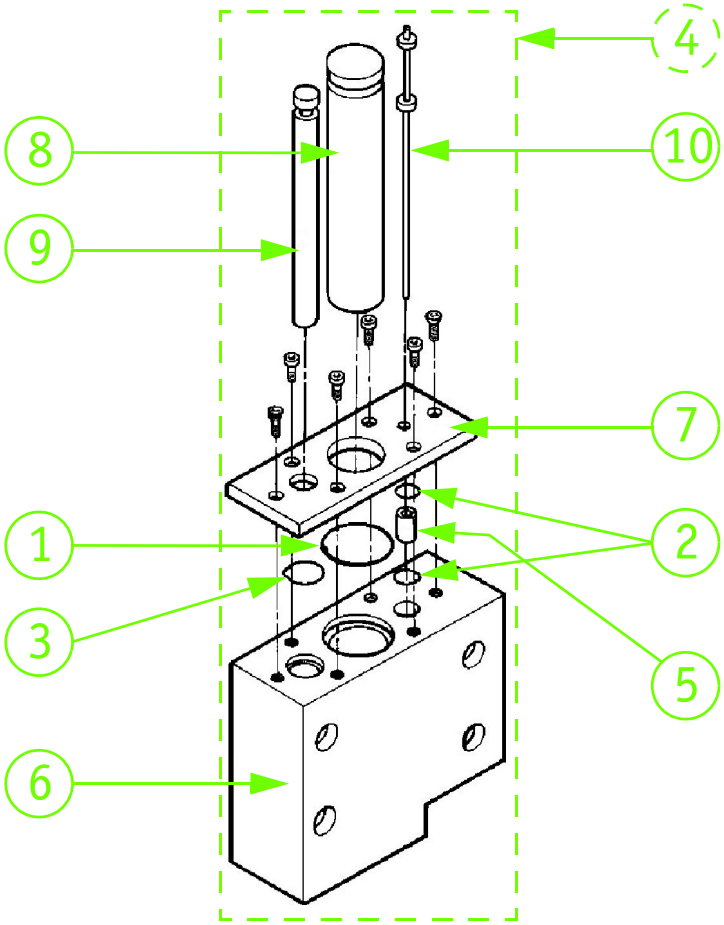
Number	Reference	Designation
1	E0012926700	PCB, BATTERY ASSY CRP200
2	G1001410	PCB,CRP BOARD CRP200
3	E1000349100	CABLE,CRP-DISPLAY CRP200
4	E1000334900	ADHESIVE,FERRITE CRP200
5	E1000348900	CABLE, LIQ.VALVE BLOCK 8-10 CRP

3. Reagent sensor 2 view



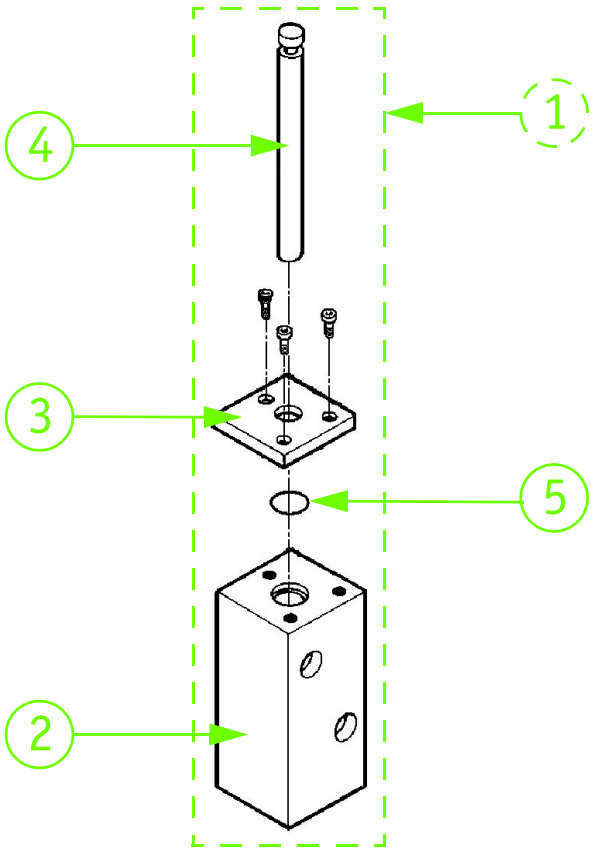
Number	Reference	Designation
1	G2002320	SENSOR, REAG. SENSOR 2 WAY CRP
2	H1008152002	CABLE, CLEANER SENSOR CRP200
3	H1008152003	CABLE, LYSE SENSOR CRP200

4. Liquid syringe view



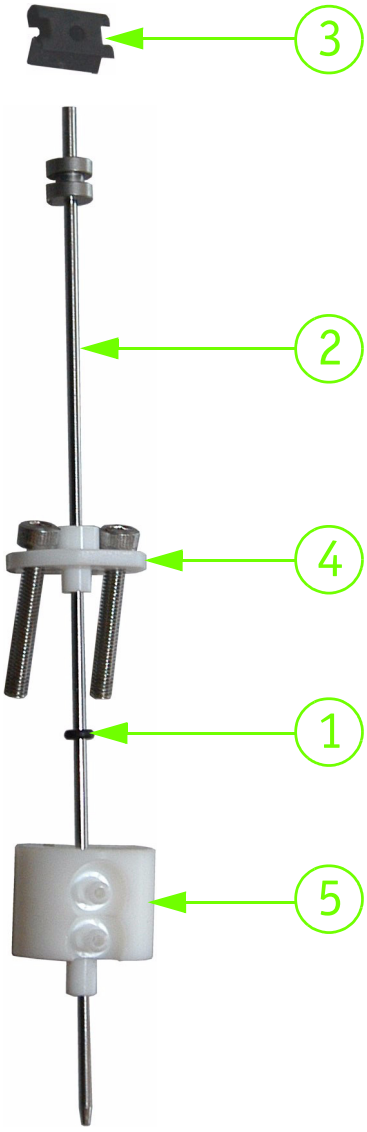
Number	Reference	Designation
1	F0020373000	O'RING,DILUENT PISTON CRP200
2	FAA055A	O'RING,MICROS SAMPLING SYRINGE
3	FAA036A	O'RING, FLOW CELL+LYSE DISP.MIC
4	G0166380	SYRINGE,3 SYR. BLOCK ASSY CRP200
5	H1008301001	O'RING, TEFLON 12µL SYRINGE CRP200
6	H1008302001	SYRINGE,DIL. BLOCK BODY CRP200
7	H1008303001	SYRINGE,DILUTION BLOCK COVER
8	H1008304002	SYRINGE,DILUENT PISTON (KELF)
9	H1008305001	SYRINGE,LYSE PISTON CRP200
10	H1008331001	NEEDLE,SAMPLE DISPENSER CRP200

5. CRP syringe view



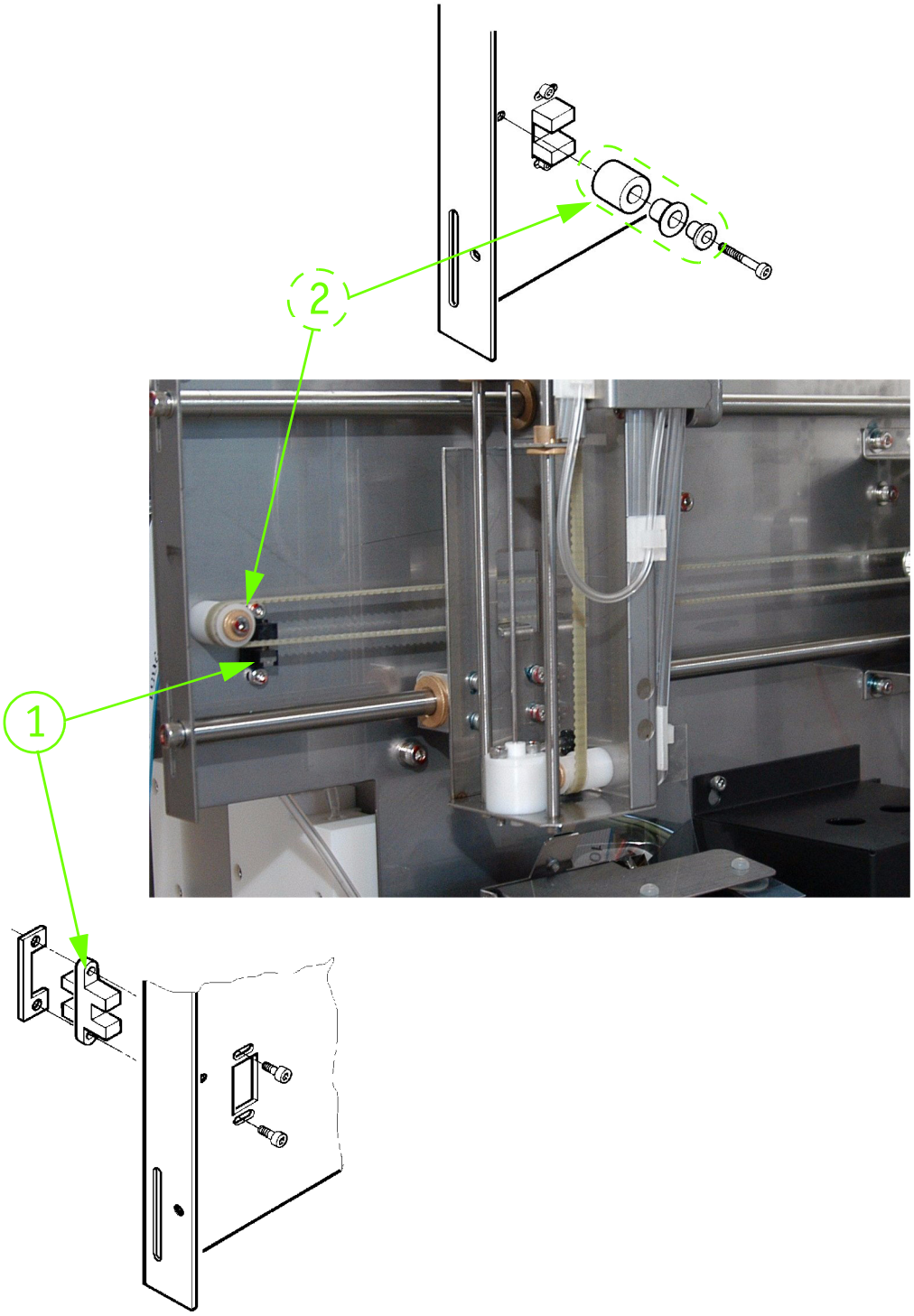
Number	Reference	Designation
1	G0166381	SYRINGE,CRP SYRINGE ASSY CRP200
2	H1008322001	SYRINGE,CRP SYRINGE BODY CRP200
3	H1008323001	SYRINGE,CRP BOTTOM PLATE CRP200
4	H1008305001	SYRINGE,LYSE PISTON CRP200
5	FAA036A	O'RING,FLOW CELL+LYSE DISP.MIC

6. Sampling needle rinsing block view



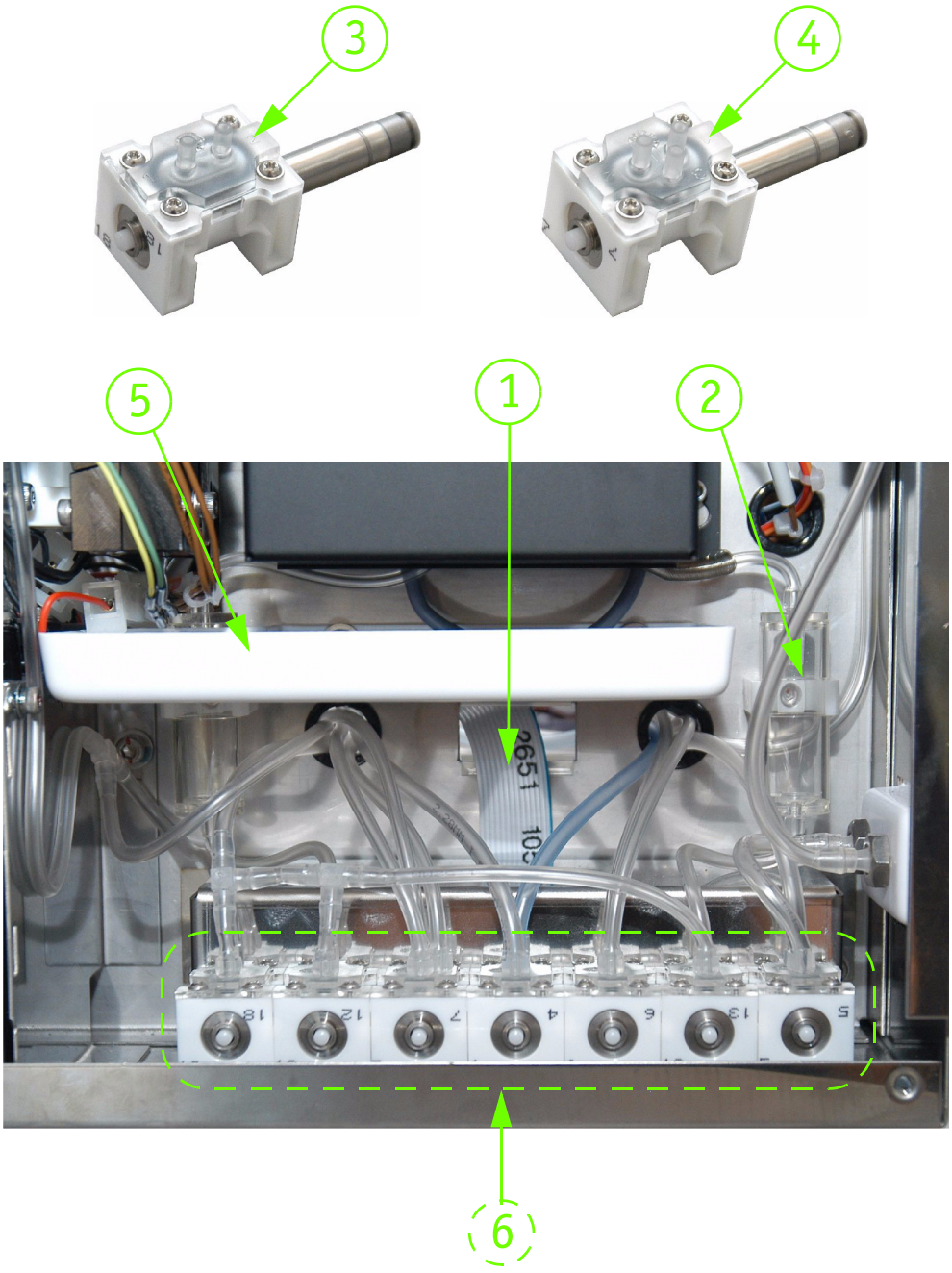
Number	Reference	Designation
1	FAA053A	O'RING,SAMPLING NEEDDLE MICROS OT
2	GBC069AS	NEEDLE,SAMPLING MICROS OT/LC
3	DBK019A	CLIP,SAMPLING NEEDLE HOLDER
4	H1007659001	NEEDLE,GUIDE CRP200
5	H1008308001	NEEDLE,RINSING BLOCK CRP200

7. Carriage sensor & pulley view



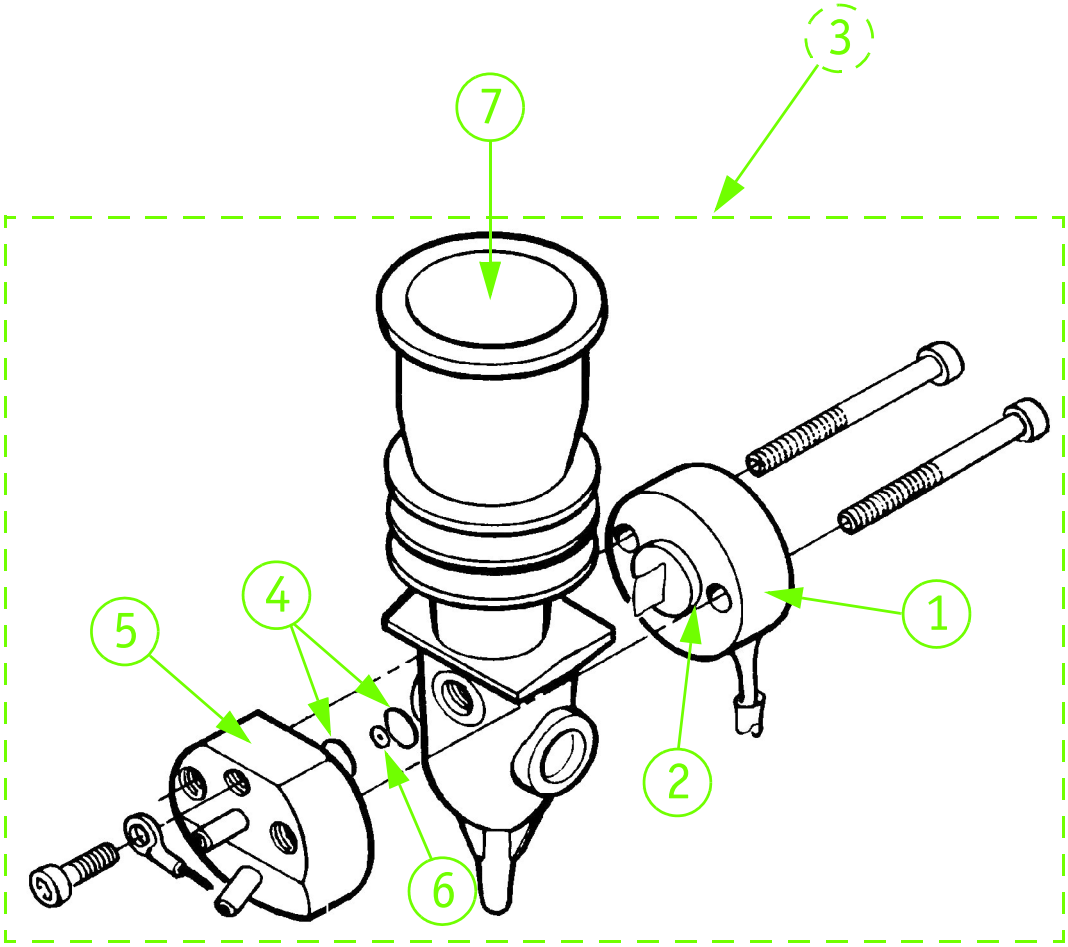
Number	Reference	Designation
1	G0167050	SENSOR,OPTIC CARRIAGE CRP200
2	G2002319	KIT,PULLEY ASSY CRP200

8. LV2 view



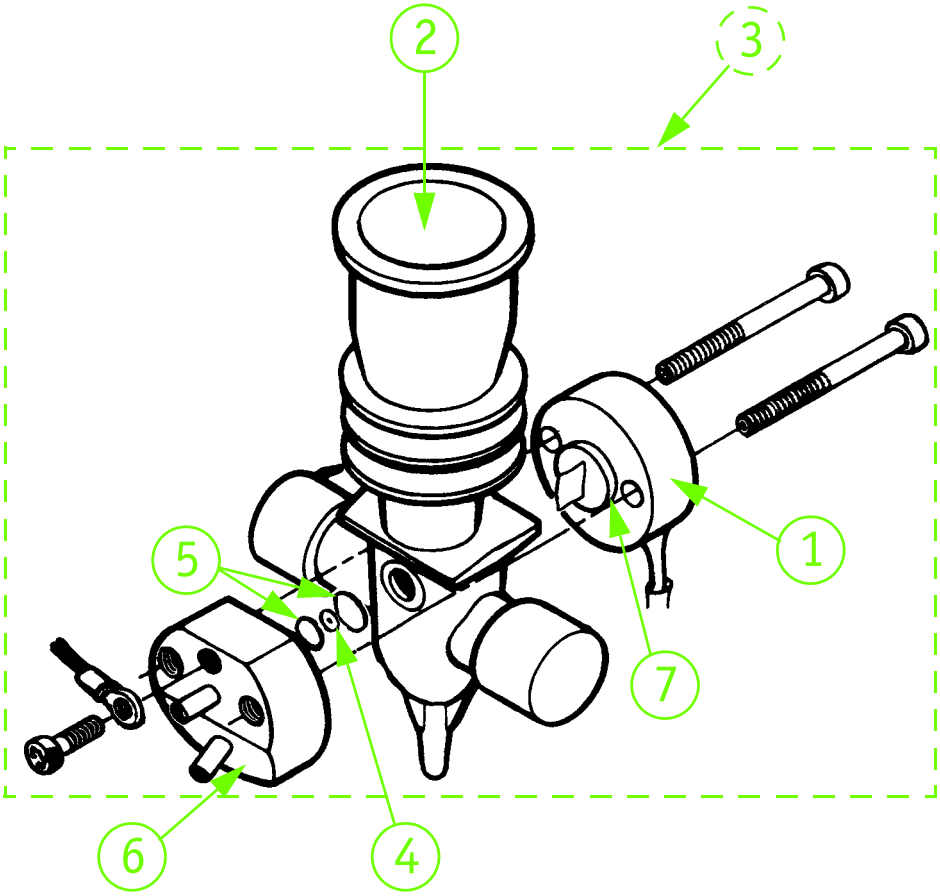
Number	Reference	Designation
1	E1000349000	CABLE,LIQ.VALVE BLOCK 5-18 CRP
2	XCA167A	CHAMBER,ISOLATOR (SMALL)
3	XDA481B	VALVE,LIQ. 2WAYS/NC W/O COIL
4	XDA483B	VALVE,LIQ. 3WAYS W/O COIL
5	F0023485400	CUP,OVERFLOW RBC/WBC CRP200
6	XDA588CS	VALVE,7 LIQ VALVE ASSY(18,.,5)

9. RBC chamber view



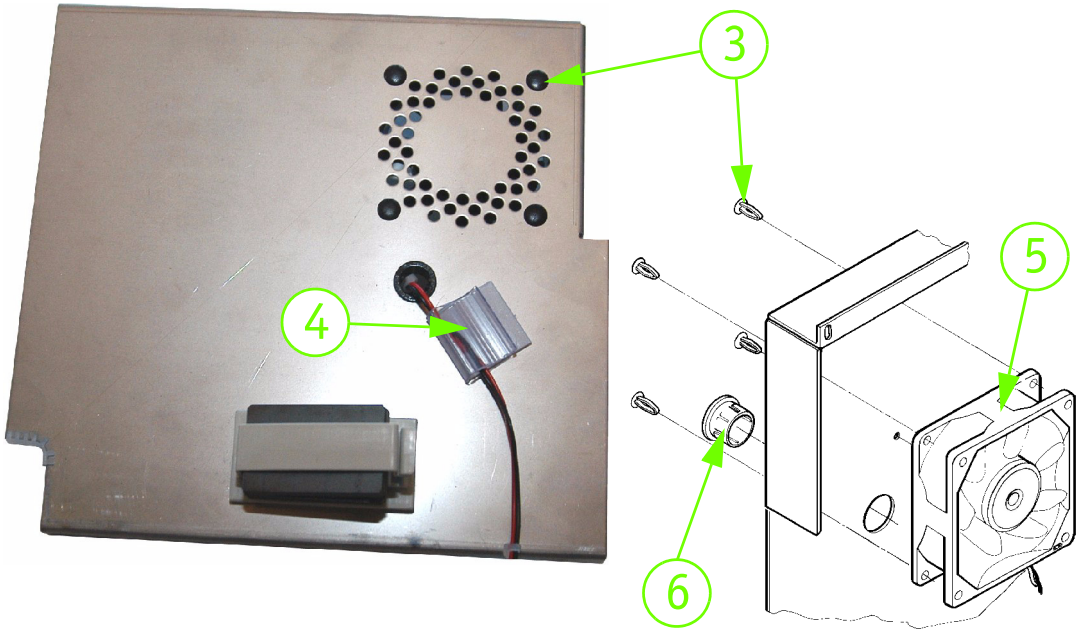
Number	Reference	Designation
1	XBA413A	CABLE,COAX RBC MICROS 60
2	FAA046A	O'RING,COAXIAL CABLE
3	XDA470ES	CHAMBER,RBC COMPLETE
4	GBG275A	O'RING, APERTURE D=0.5 P60/P80
5	GBC239A	CHAMBER,COUNTING HEAD MIC 60
6	H0525166003	CHAMBER,APERTURE 50µ
7	F2000037700	CHAMBER, RBC BODY CRP200

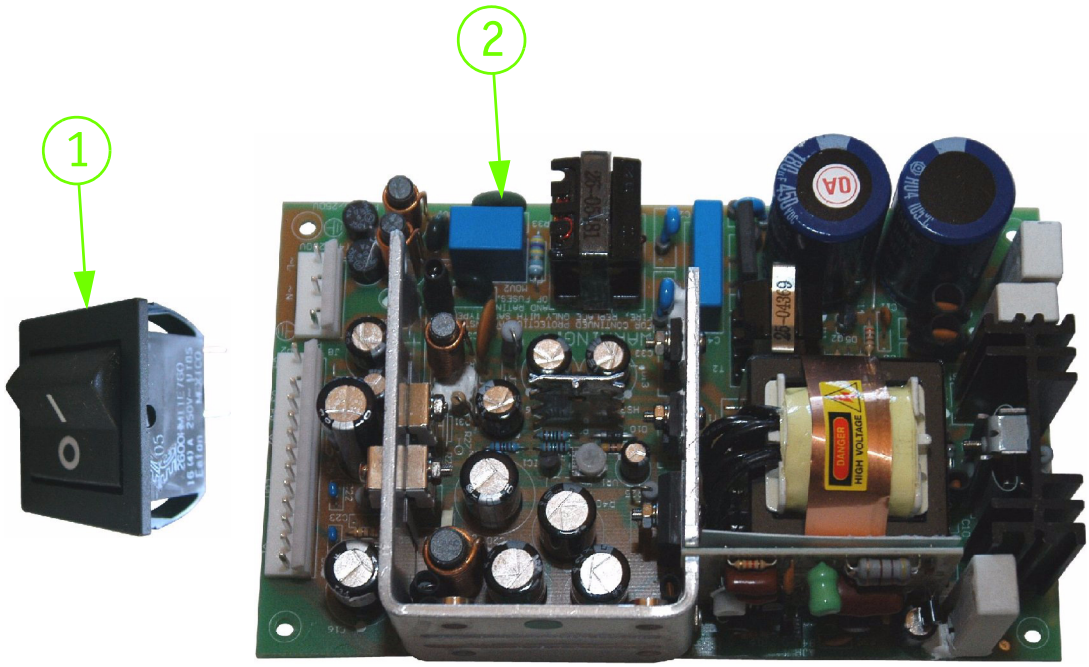
10. WBC chamber view



Number	Reference	Designation
1	XBA412A	CABLE,COAX WBC MICROS 60
2	XDA472B	CHAMBER,HB ASSY MICROS 60
3	XDA471ES	CHAMBER,WBC/HB MICROS 60 CPTE
4	H0525166002	CHAMBER,APERTURE 80µ
5	GBG275A	O'RING, APERTURE D=0.5 P60/P80
6	GBC239A	CHAMBER,COUNTING HEAD MIC 60
7	FAA046A	O'RING,COAXIAL CABLE

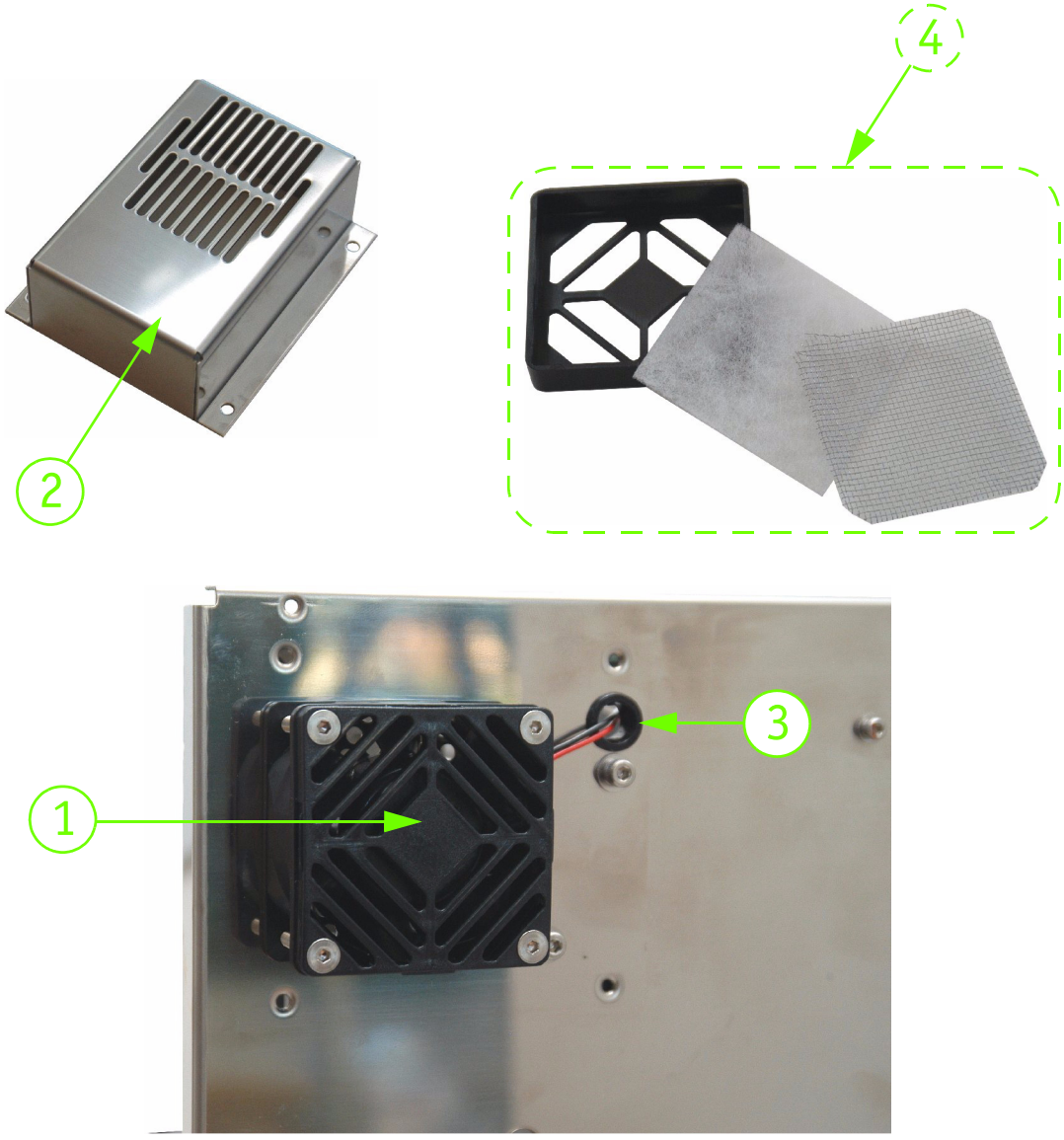
11. Power supply view





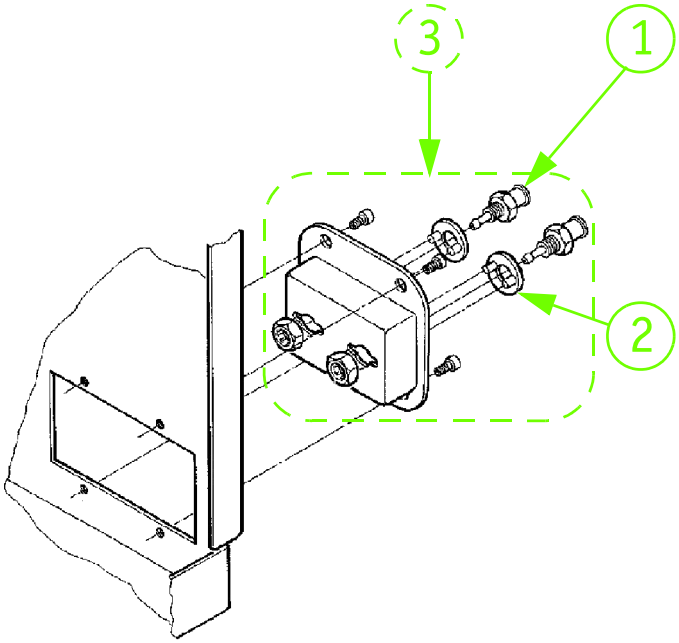
Number	Reference	Designation
1	DBM001A	SWITCH,POWER ON/OFF
2	E1000342800	PCB,POWER SUPPLY BOARD CRP200
3	DBK012A	CLIP,FAN HOLDER
4	DBK003A	ADHESIVE,HOLDER FOR FLAT CABLE
5	G0166270	FAN, POWER SUPPLY FAN CRP200
6	DBE018A	CABLE,BUSHING D=9,5 BLACK

12. Cooling fan view



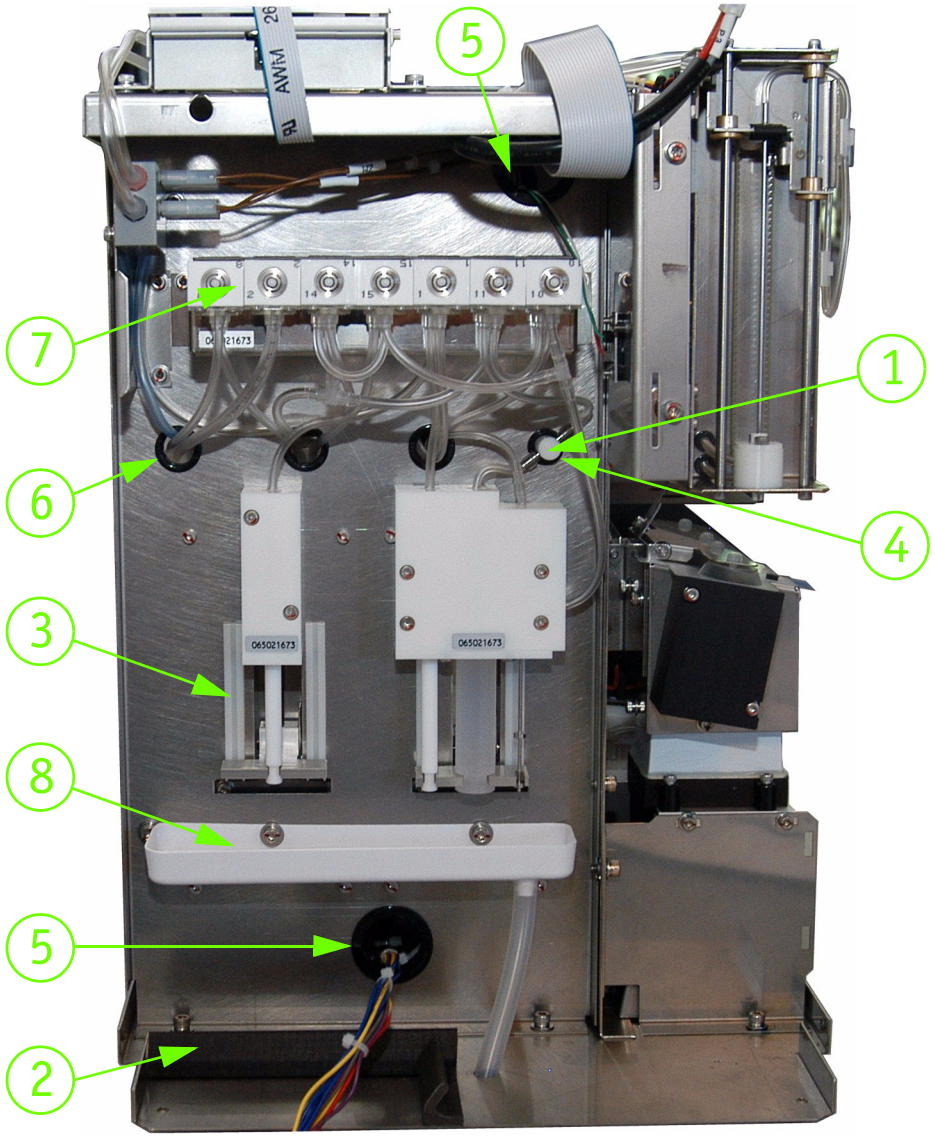
Number	Reference	Designation
1	G0172080	FAN, REAR FAN CRP200
2	H1008391001	COVER,REAR FAN PROTECTION CRP200
3	DBE018A	CABLE,BUSHING D=9,5 BLACK
4	G2002532	FAN, MAIN FAN FILTER ASSY CRP200

13. Reagent connection plate view



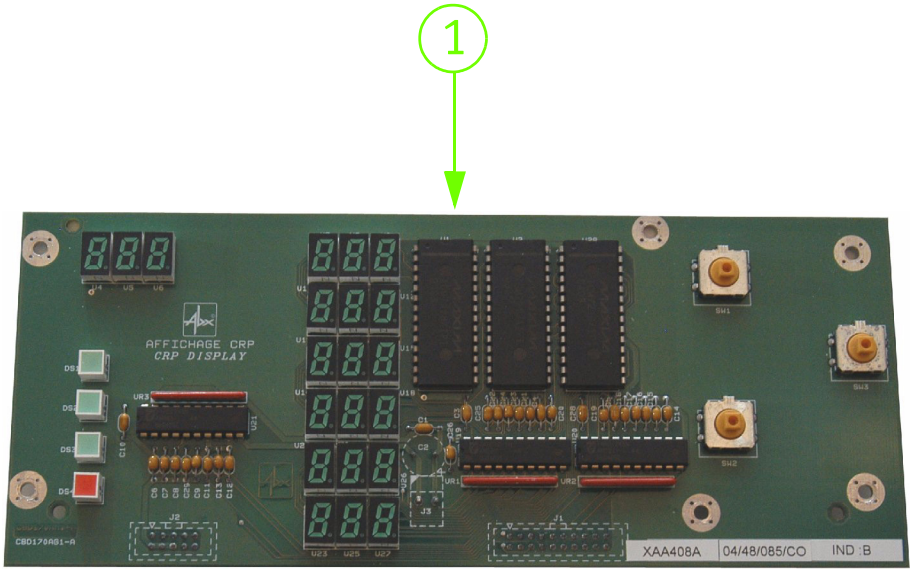
Number	Reference	Designation
1	EAC010A	FITTING,LUER FEMALE I=3MM
2	F1000380800	FITTING,ANTI ROTATION WASHER
3	G0166210	REAGENT,CONNEXION PLATE CRP200

14. Front view



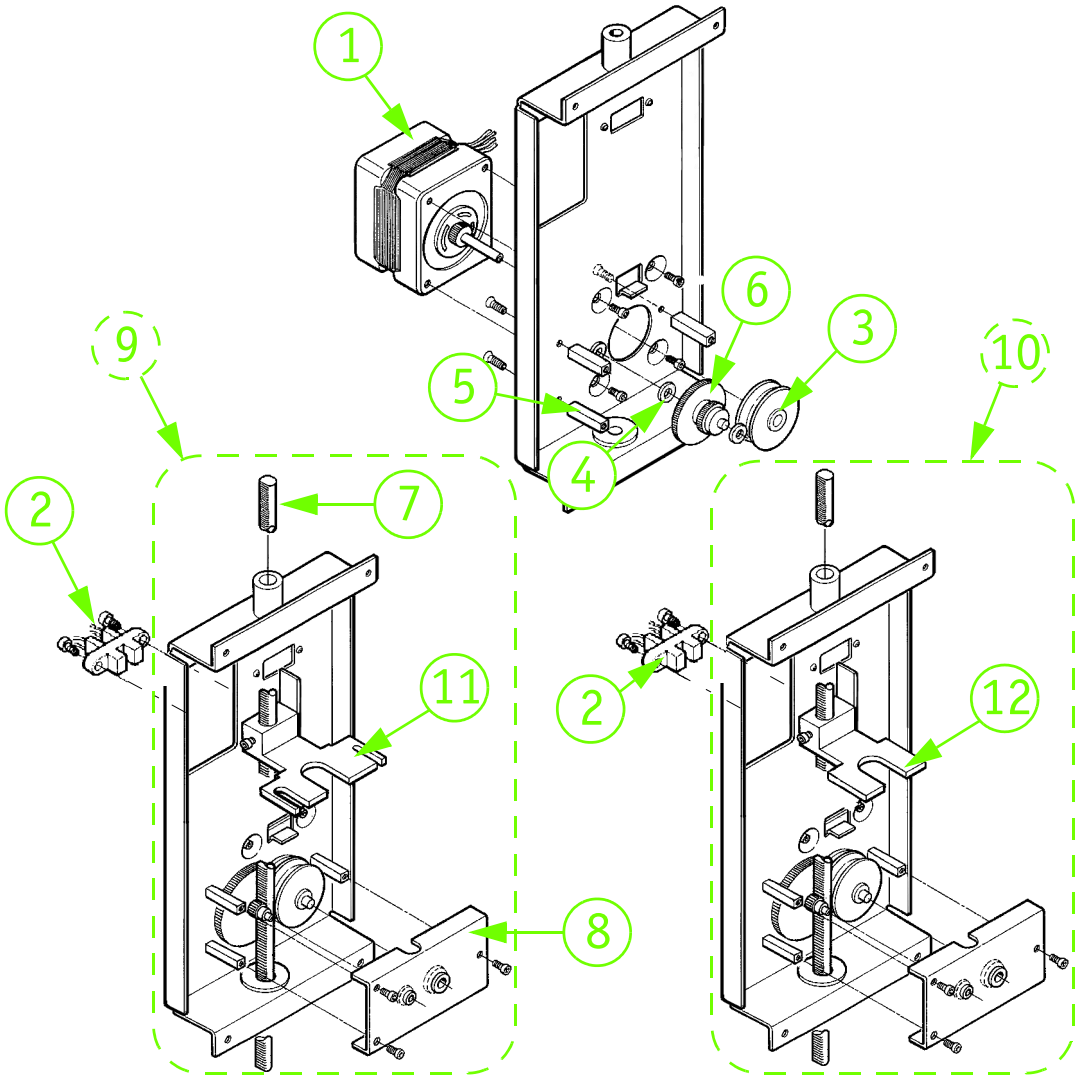
Number	Reference	Designation
1	XBA281A	SENSOR,TEMPERATURE MIC./LC220
2	E1000117600	PROTECTION, SHIELD FOAM L=1M
3	CAG008A	SYRINGE,PLASTIC GUIDE L=63,5
4	DBE018A	CABLE,BUSHING D=9,5 BLACK
5	DBE017A	CABLE,BUSHING D=23,8 BLACK
6	DBE021A	CABLE,BUSHING D=12,7 BLACK
7	XDA589CS	VALVE,7 LIQ VALVE ASSY(10,.,8)
8	F1000386000	CUP,OVERFLOW SYRINGES CRP200

15. Display board view



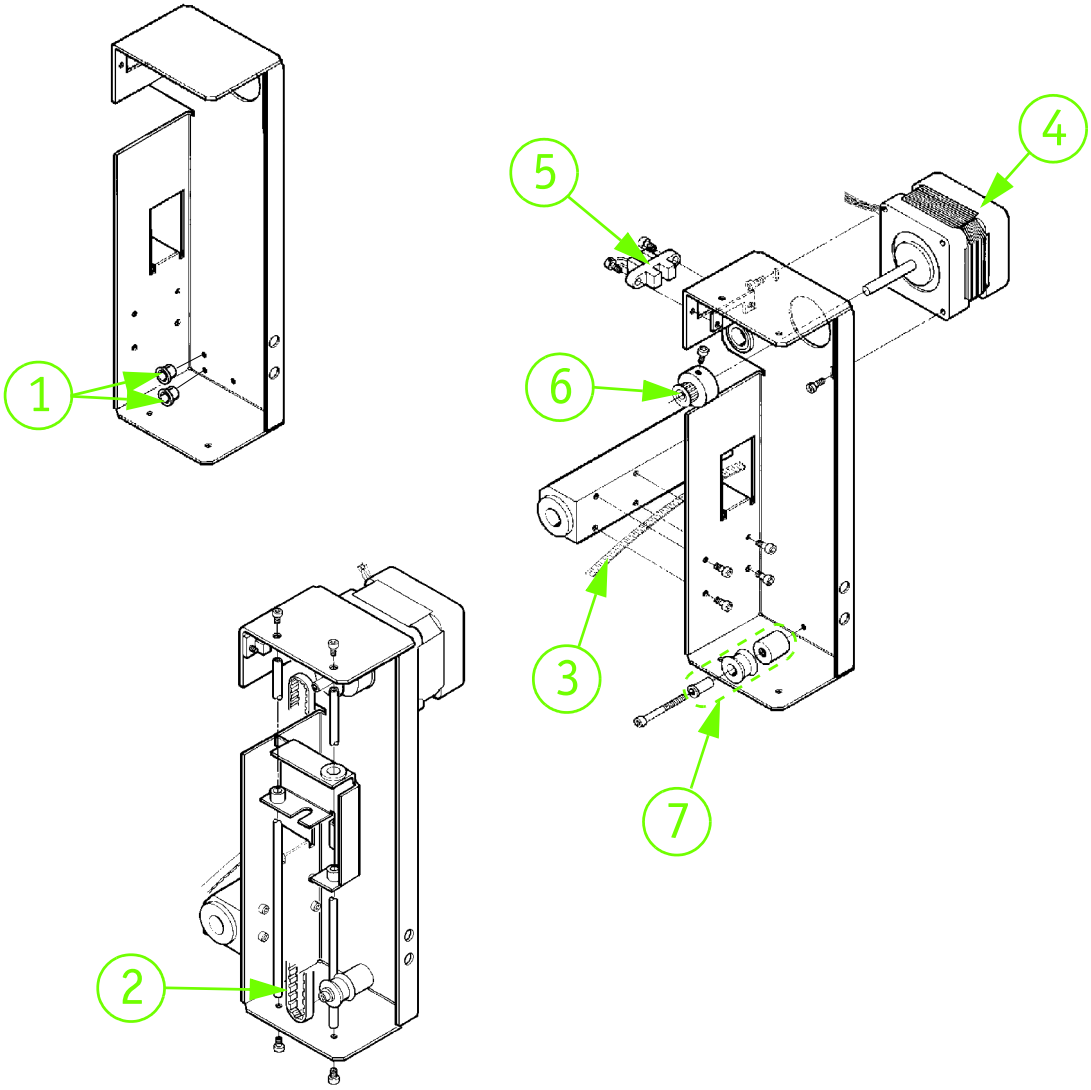
Number	Reference	Designation
1	E0013464600	PCB,DISPLAY BOARD CRP200

16. Syringe mechanical view



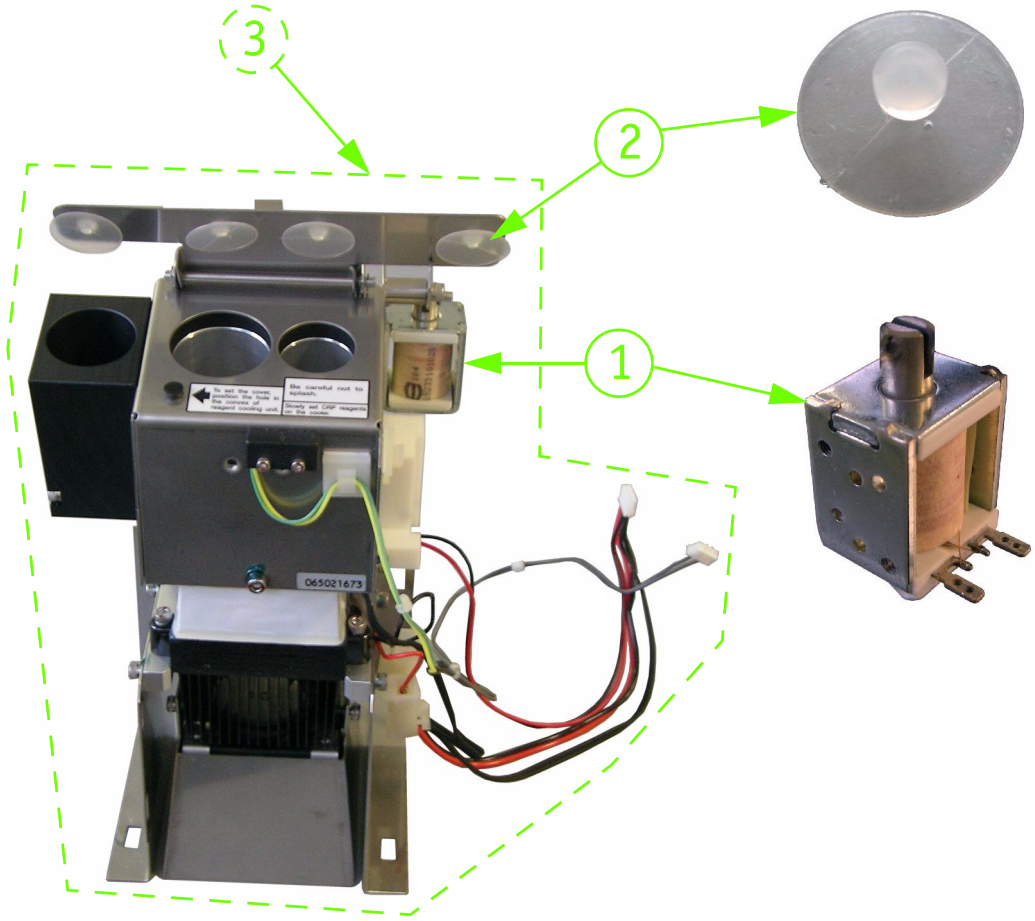
Number	Reference	Designation
1	G0166330	MOTOR,STEP BY STEP+GEAR CRP200
2	G0167040	SENSOR,OPTIC CRP/DIL SYR. CRP200
3	H1008310001	SYRINGE,PULLEY SYR/LIQ+AIR CRP200
4	H1008311001	SYRINGE,WASHER SYR/LIQ+AIR CRP200
5	H1008333002	MOTOR,CROSSPIECE S/LIQ+AIR CRP200
6	H1008357001	SYRINGE,GEARING S/LIQ.+AIR CRP200
7	H1008359001	SYRINGE,COGGRAIL FOR LIQ. SYR.CRP200
8	H1008376001	MOTOR,REDUCTOR PLATE ASSY CRP200
9	G2002534	MOTOR,REDUCTOR 3 SYR CRP200
10	G2002535	MOTOR,REDUCTOR CRP SYR CRP200
11	H1001636001	SYRINGE,3 SYR.TRANS.GUIDE CRP200
12	H1008338002	SYRINGE,CRP TRANS.GUIDE CRP200

17. Carriage view



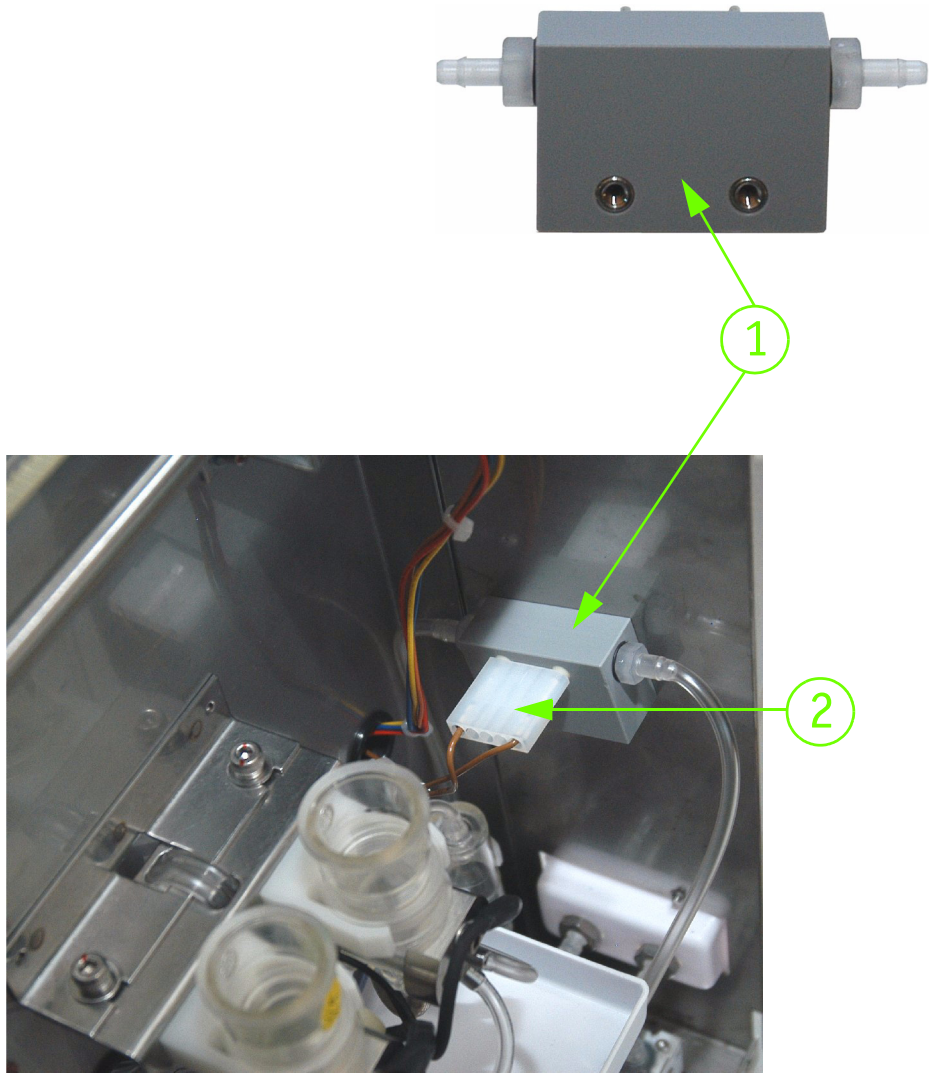
Number	Reference	Designation
1	DBE014A	CABLE,BUSHING D=3,2 BLACK
2	F1000391700	BELT,NEEDLE 285MM CRP200
3	F1000391800	BELT,CARRIAGE 650MM CRP200
4	G0166610	MOTOR,STEPPER CRP200
5	G0166620	SENSOR,NEEDLE CARRIAGE CRP200
6	H1008358001	MOTOR,PULLEY (NEEDLE) CRP200
7	G2002319	KIT,PULLEY ASSY CRP200

18. CRP cold assy view



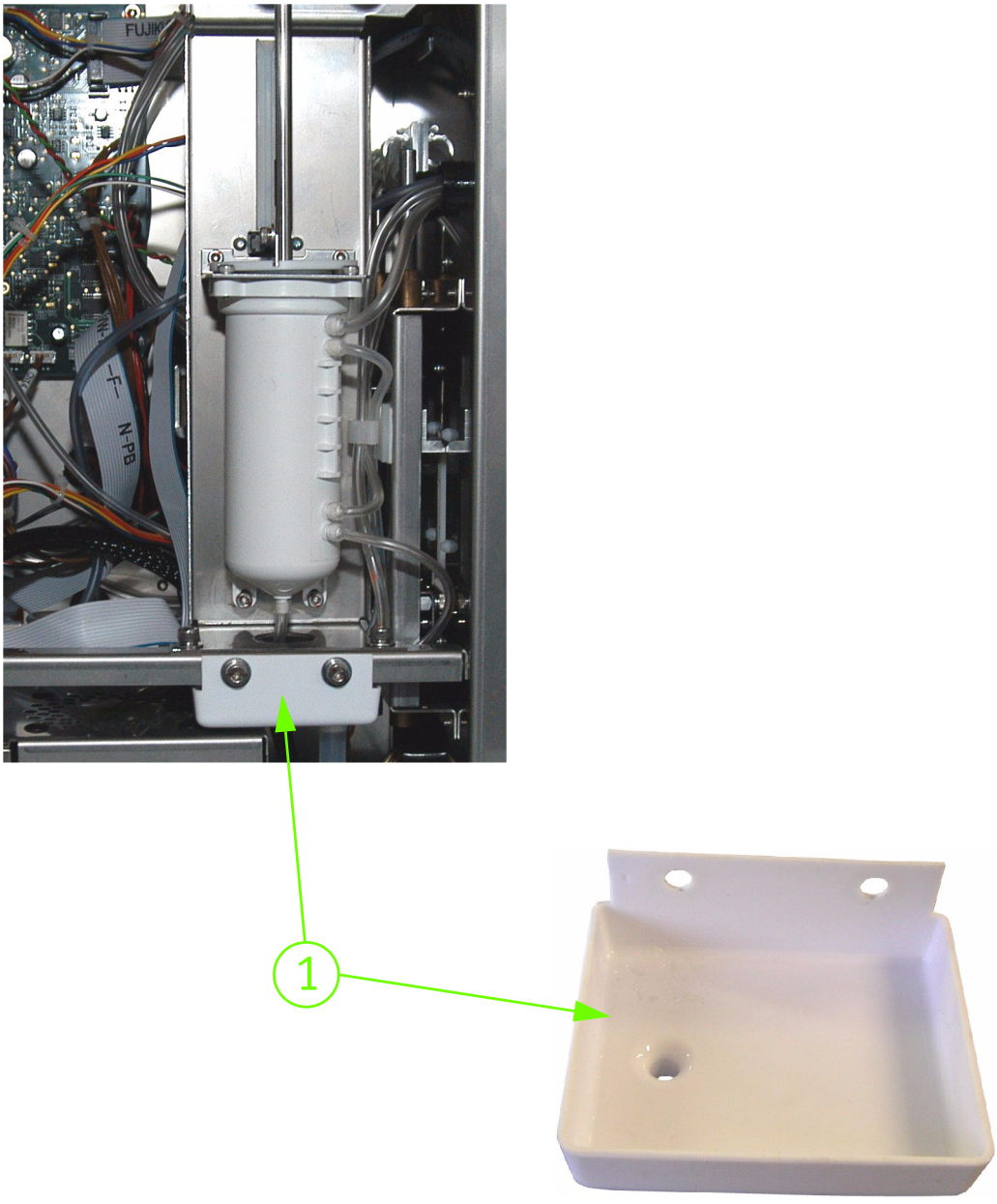
Number	Reference	Designation
1	DAM007A	VALVE,SOLENOID CRP BLOCK
2	H2003841001	REAGENT,SILICON STOPPER CRP200
3	G2002533	CHAMBER, CRP COLD ASSY CRP200

19. Reagent sensor 1 view



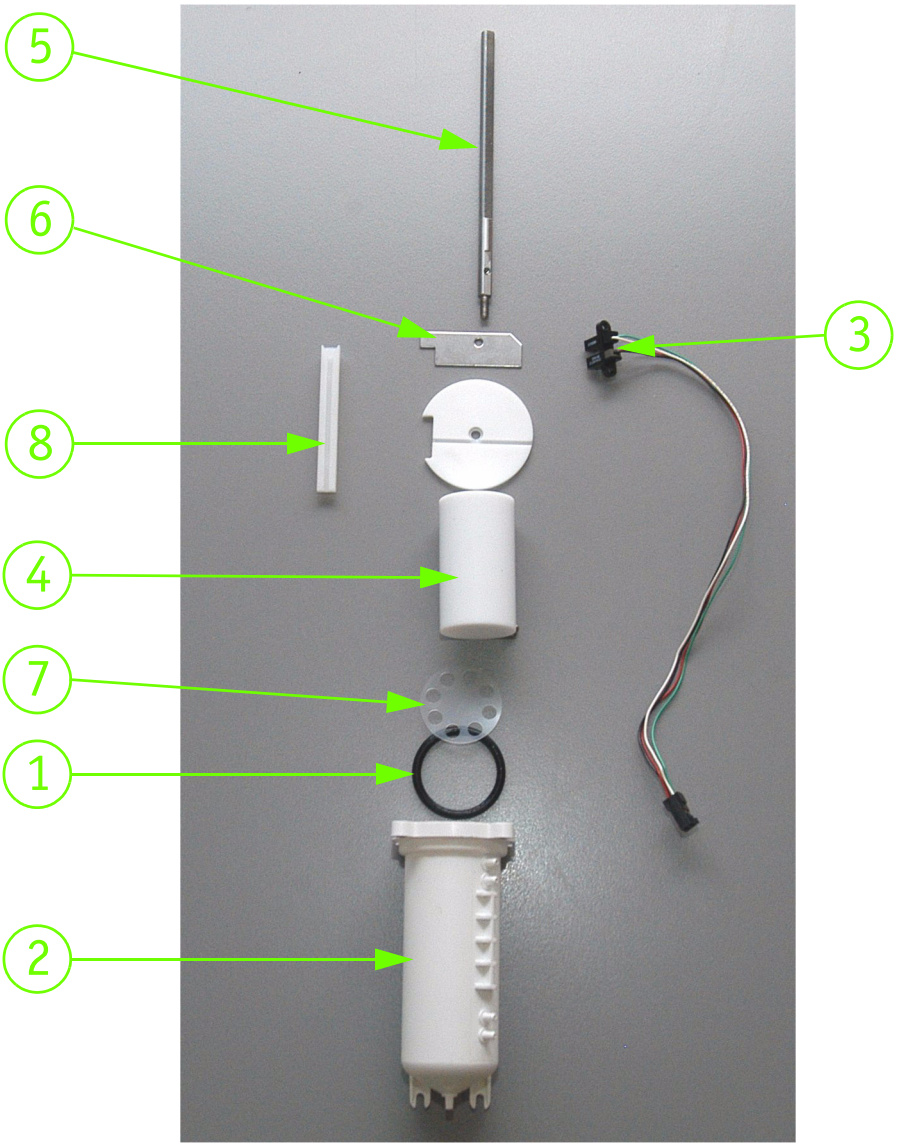
Number	Reference	Designation
1	G2002318	SENSOR, DILUENT SENSOR CRP200
2	H1008152001	CABLE, DILUENT SENSOR CRP200

20. Air syringe cup view



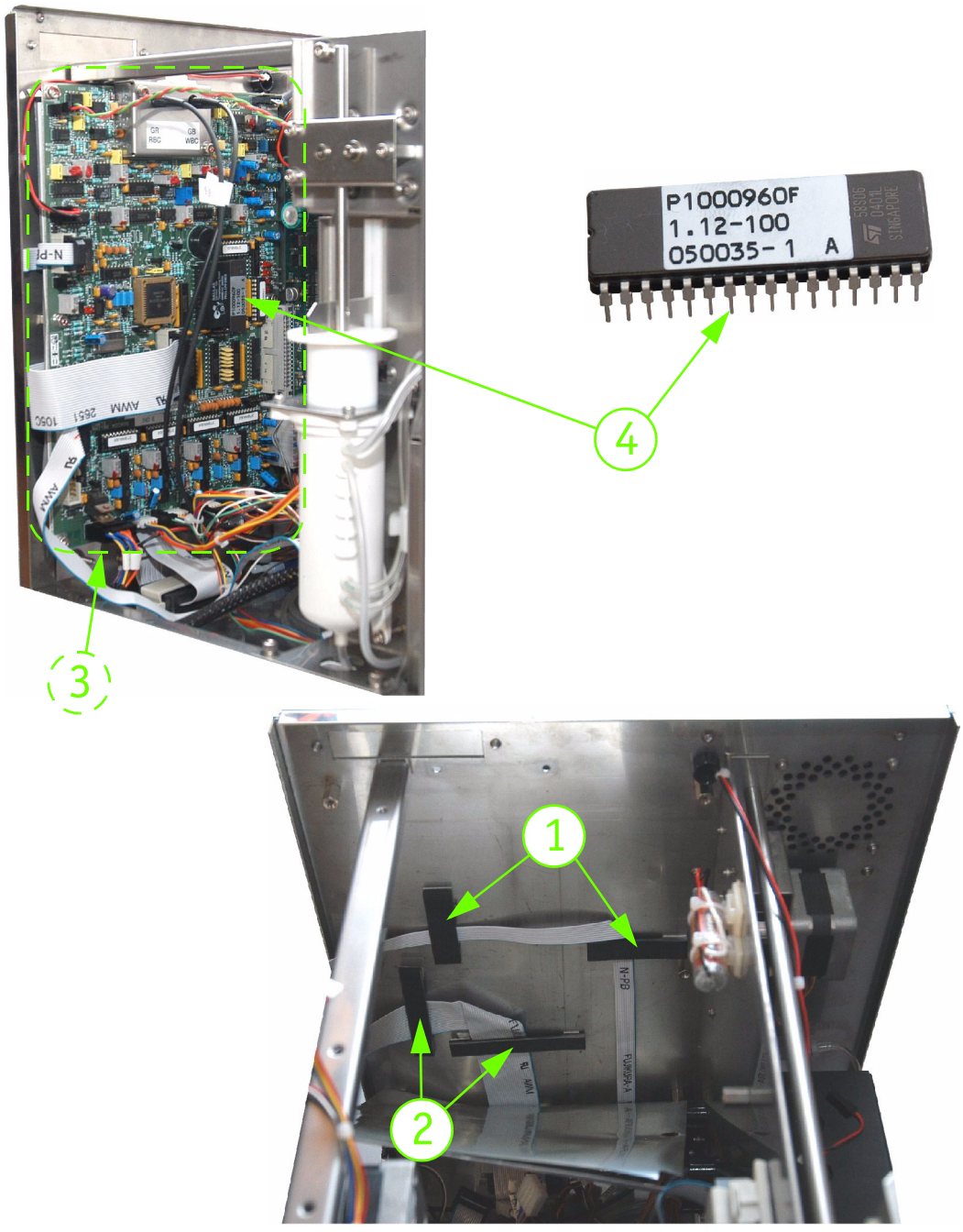
Number	Reference	Designation
1	GBF070A	CUP,OVERFLOW AIR SYRINGE LC270

21. Air syringe view



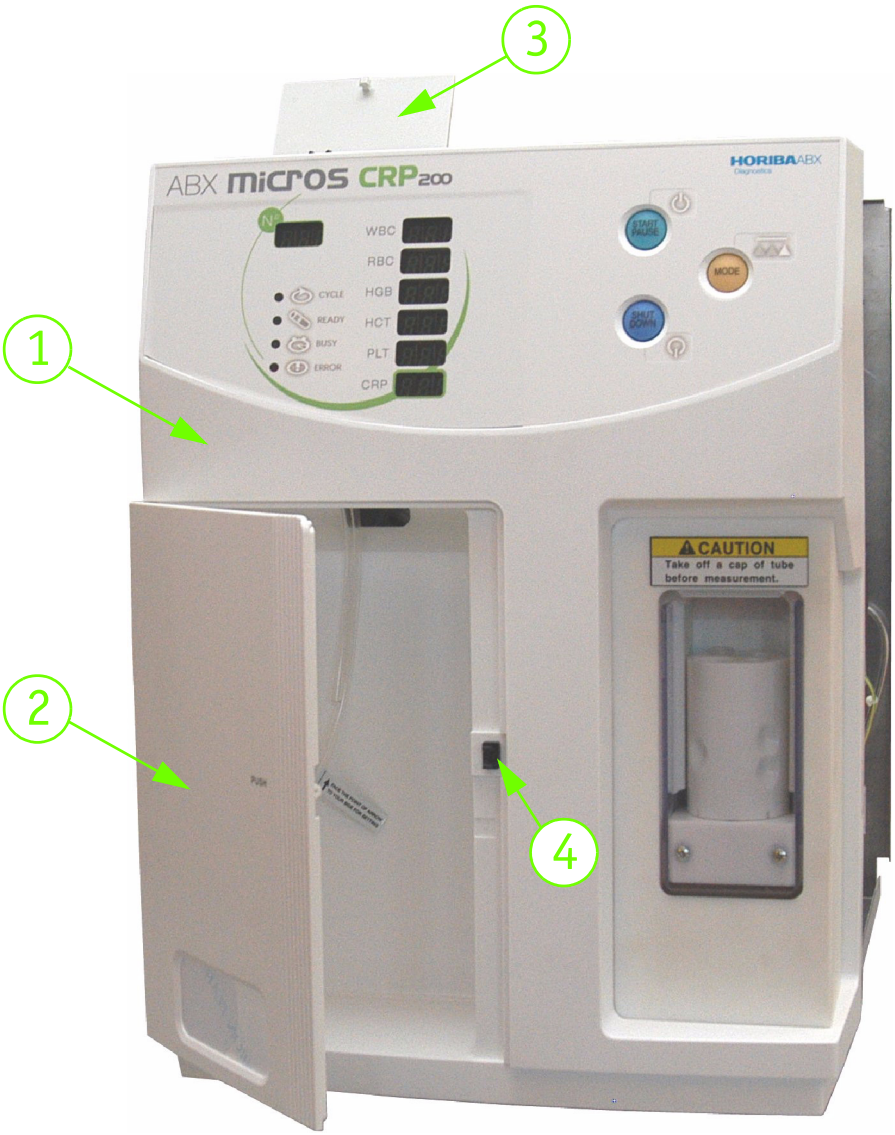
Number	Reference	Designation
1	FAA017A	O'RING,TANK MIN/AG+WASTE MIC
2	GBC260AS	CHAMBER,INJ.WASTE/VAC.SYR.BODY
3	G0166320	SENSOR,VAC/WASTE SYRINGE CRP200
4	H1008317001	CHAMBER,WASTE/VAC. SYR. PISTON
5	H1008355001	SYRINGE,COGGRAIL FOR AIR SYR.
6	H1008373001	SENSOR, OPTIC DETECT TAB CRP200
7	H2003334001	CHAMBER,WASTE CHICANE CRP200
8	CAG008A	SYRINGE,PLASTIC GUIDE L=63,5

22. Main board view



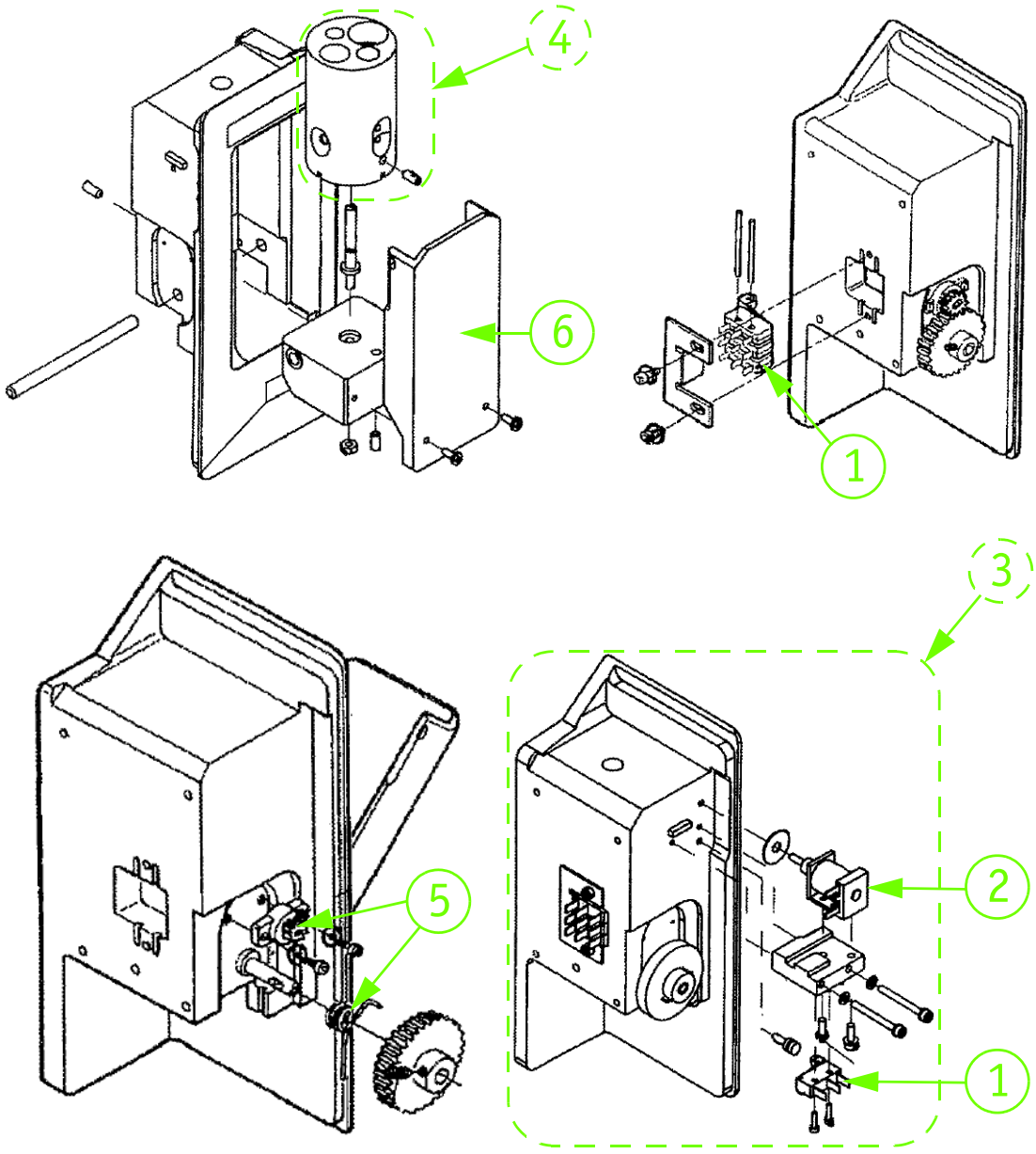
Number	Reference	Designation
1	DBK014A	CABLE,HOLDER RS FLAT CABLE
2	DBK015A	CABLE,HOLDER PRINT. FLAT CABLE
3		Not available at the time of publication
4		Not available at the time of publication

23. Front panel view



Number	Reference	Designation
1	G0332140	COVER,FRONT COVER ASSY CRP200
2	L0163761	COVER,FRONT REAGENT DOOR CRP200
3	L0338230	COVER, KEYBOARD CRP200
4	F0022990300	COVER,REAGENT DOOR LOCK CRP200

24. Sample holder view

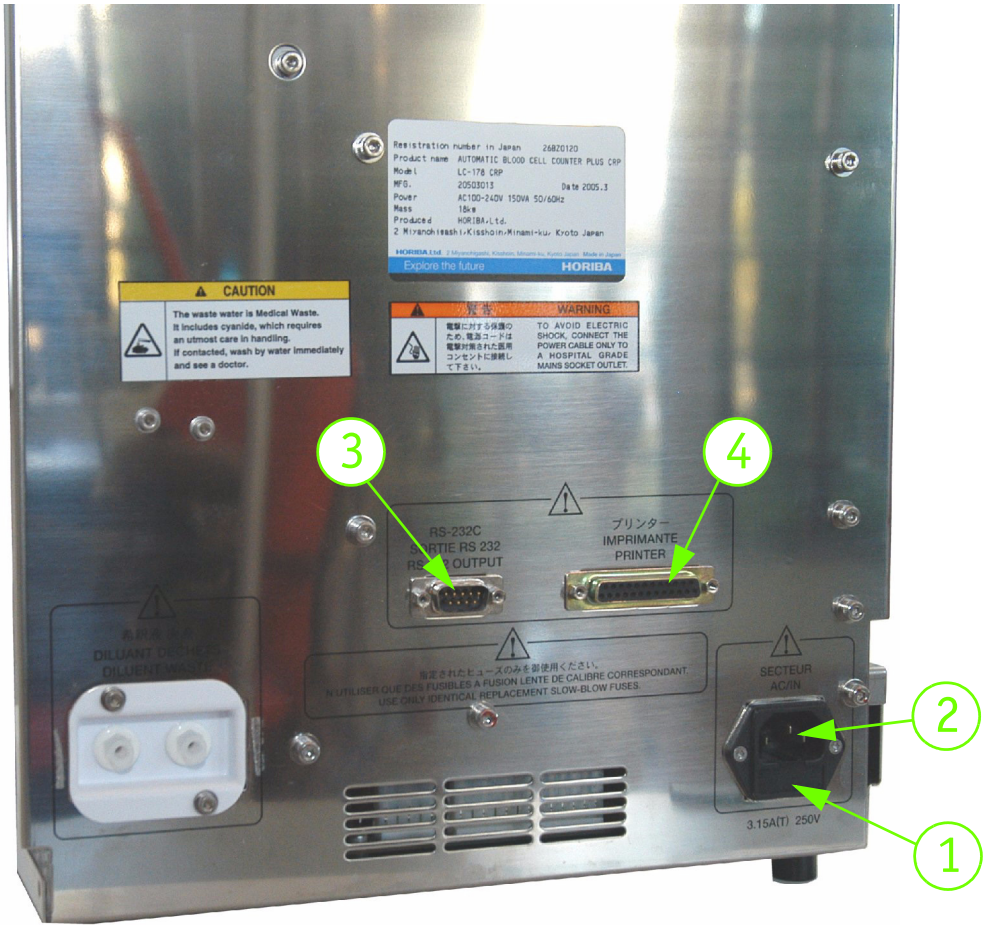


Number	Reference	Designation
1	CAE006A	SWITCH, MICROSWITCH XC5-81-82
2	DAM006A	VALVE,SOLENOID MICROS CT PIERC
3	G0166791	SAMPLING,BLOCK ASSY CRP200
4	G0175390	SAMPLING,STANDARD TUBE HOLDER
5	G0289970	SAMPLING,BRAKING GEAR + SPRING
6	H1016977001	COVER,SAMPLING BLOCK DOOR CRP200

25. Cover view

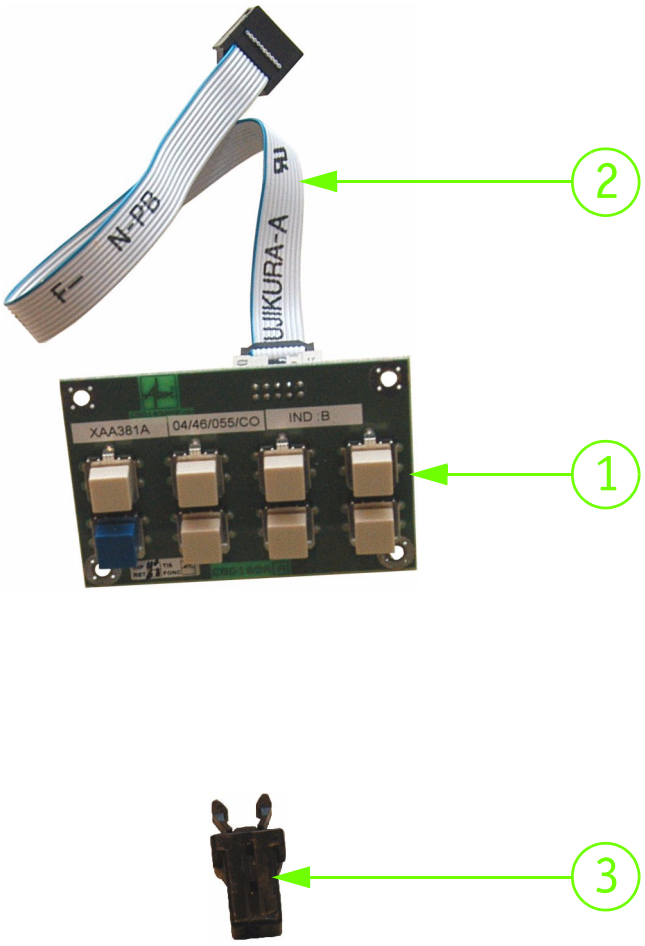
Number	Reference	Designation
1	F1001306800	COVER,SIDE DOOR LOCK ASSY CRP2
2	G0166801	COVER, MAIN COVER ASSY CRP200
3	H1031791001	COVER,CRP REAGENT DOOR CRP200

26. Back view



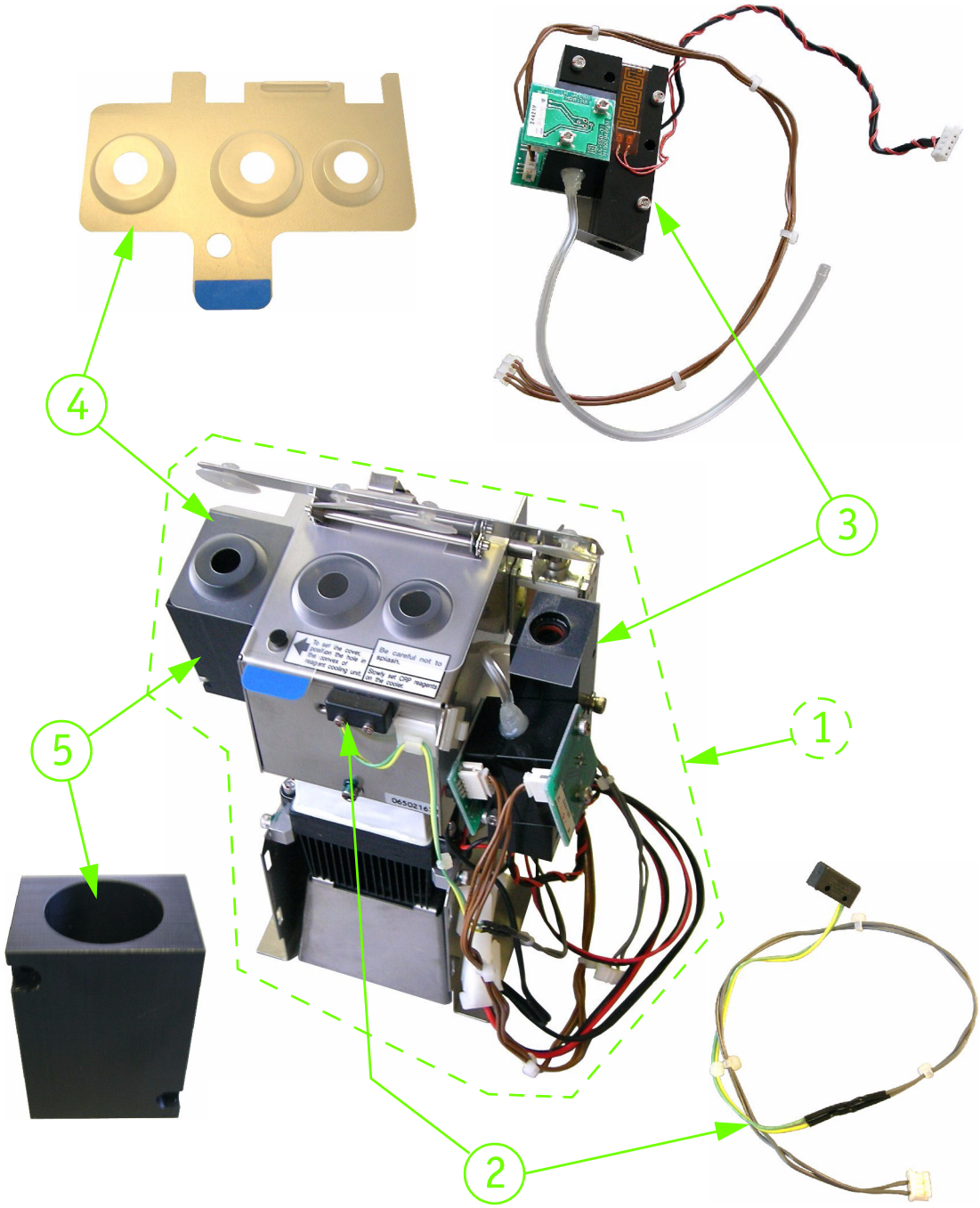
Number	Reference	Designation
1	DAR014A	FUSE,3.15A (5X20)
2	E1000072400	FILTER,MAIN POWER CRP200
3	H1009391001	CABLE,RS232 OUTPUT CRP200
4	H1009392001	CABLE,PRINTER OUTPUT CRP200

27. Keyboard assy view



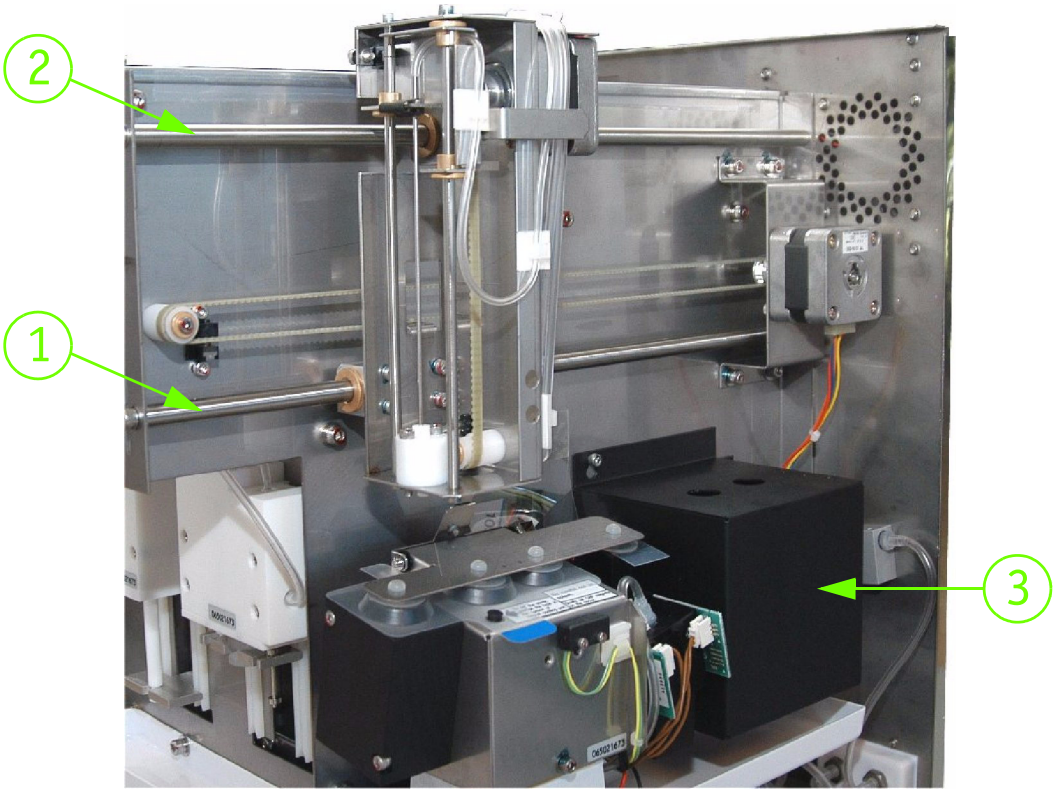
Number	Reference	Designation
1	E0013099900	PCB,KEYBOARD BOARD CRP200
2	E1000349200	CABLE,DISPLAY-KEYBOARD CRP200
3	F0022990300	COVER,REAGENT DOOR LOCK CRP200

28. CRP unit view



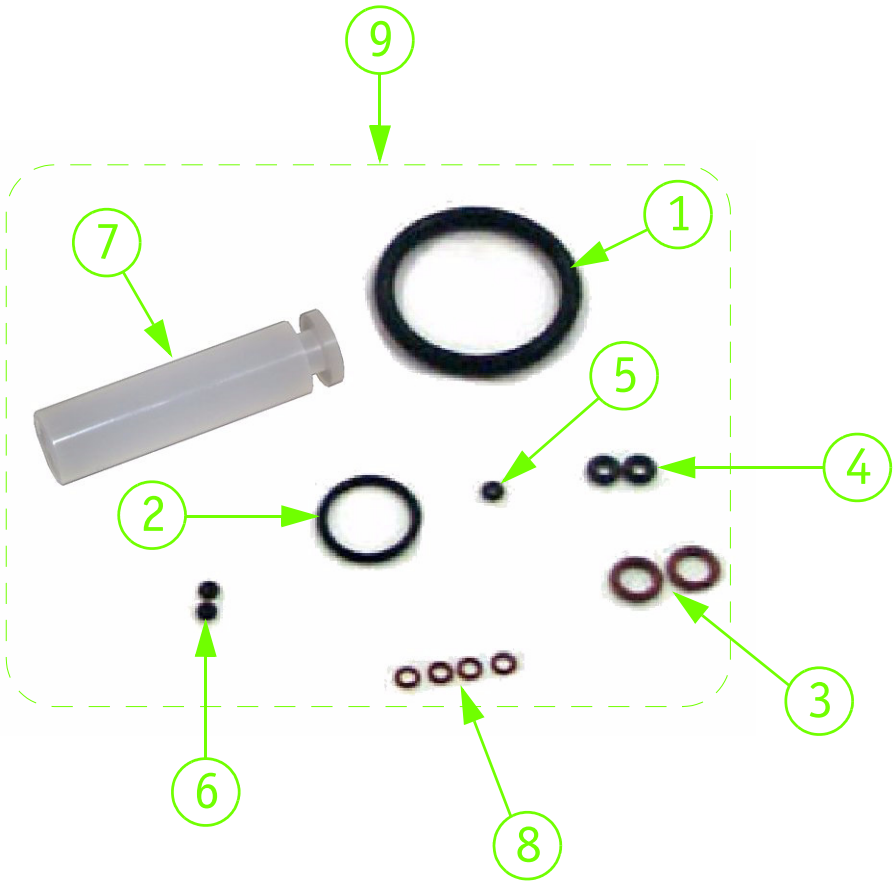
Number	Reference	Designation
1	G0166461	CHAMBER,ADJ. CRP UNIT ASSY UL
2	G0166480	SENSOR,CRP DOOR SWITCH UL CRP200
3	G0166511	CHAMBER,CRP READ.ASSY UL CRP200
4	G0332050	COVER,PLASTIC REAG.COVER CRP200
5	H1008320001	CHAMBER,SAPONINE BOTTLE HOLDER

29. Right side view



Number	Reference	Designation
1	H1008348001	CARRIAGE,BOTTOM HORIZ AXIS CRP
2	H1008350001	CARRIAGE,TOP HORIZ AXIS CRP
3	H1008389001	COVER,RBC/WBC BLACK COVER

30. Maintenance kit view

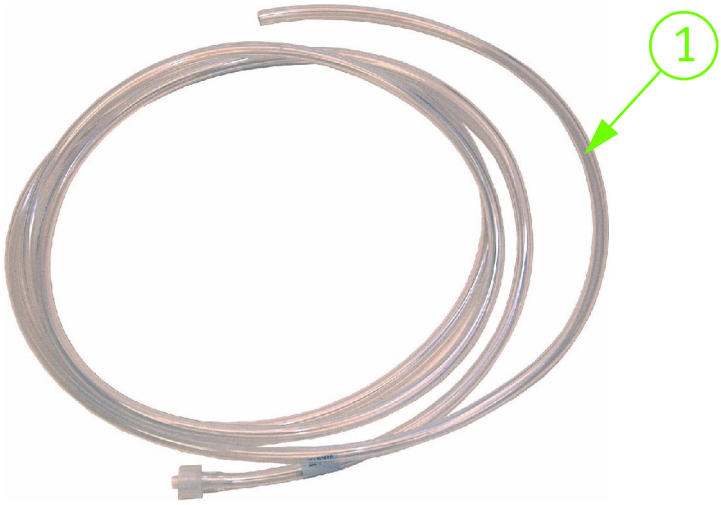


Number	Reference	Designation
1	FAA017A	O'RING,TANK MIN/AG+WASTE MIC
2	F0020373000	O'RING, DILUENT PISTON CRP200
3	FAA036A	O'RING,FLOW CELL+LYSE DISP.MIC
4	FAA046A	O'RING, COAXIAL CABLE
5	FAA053A	O'RING, SAMPLING NEEDLE MICROS OT
6	FAA055A	O'RING,MICROS SAMPLING SYRINGE
7	H1008304002	SYRINGE, DILUENT PISTON (KELF)
8	GBG275A	O'RING, APERTURE D=0.5 P60/P80
9	XEA931AS	KIT, YEARLY MAINTENANCE CRP200

31. Printer view

Number	Reference	Designation
1	CBE053A	PRINTER,SEIKO DPU414 W/O CORD
2	CBE057A	PRINTER,DPU414 SUPPLY 220V/6V
3	CBE058A	PRINTER,DPU414 SUPPLY 110V/6V

32. Straw and tubing view



Number	Reference	Designation
1	XDA693A	TUBING,WASTE P60/CRP200
2	GBC284A	REAGENT,STRAW CLEANER CRP200
3	GBC285A	REAGENT,STRAW WASTE CRP200
4	G0166911	REAGENT,STRAW DILUENT CRP200 (Not available at the time of publication)

33. Waste container view

Number	Reference	Designation
1	G0166861	REAGENT, WASTE CONTAINER CRP2